MILL SECTION of
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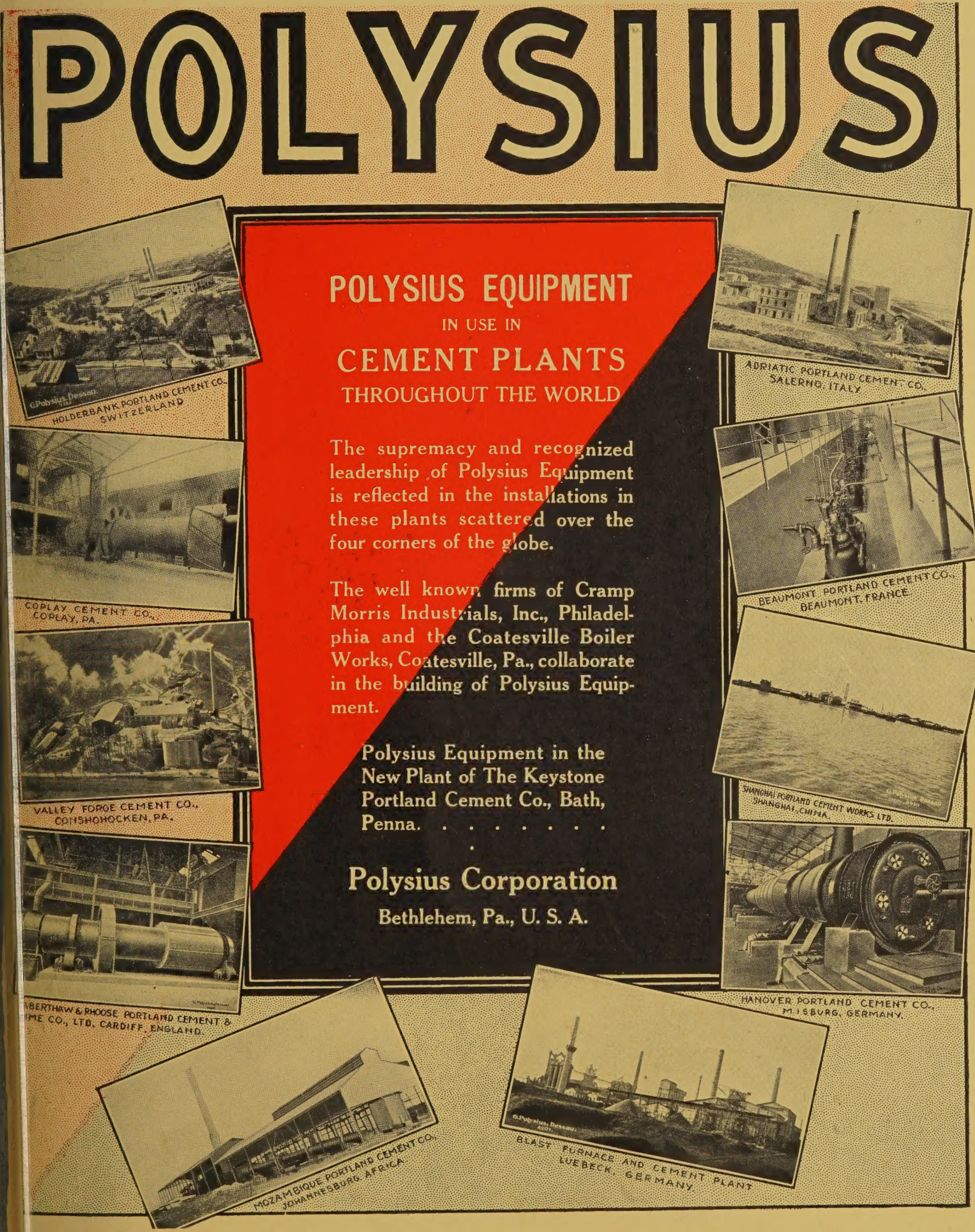
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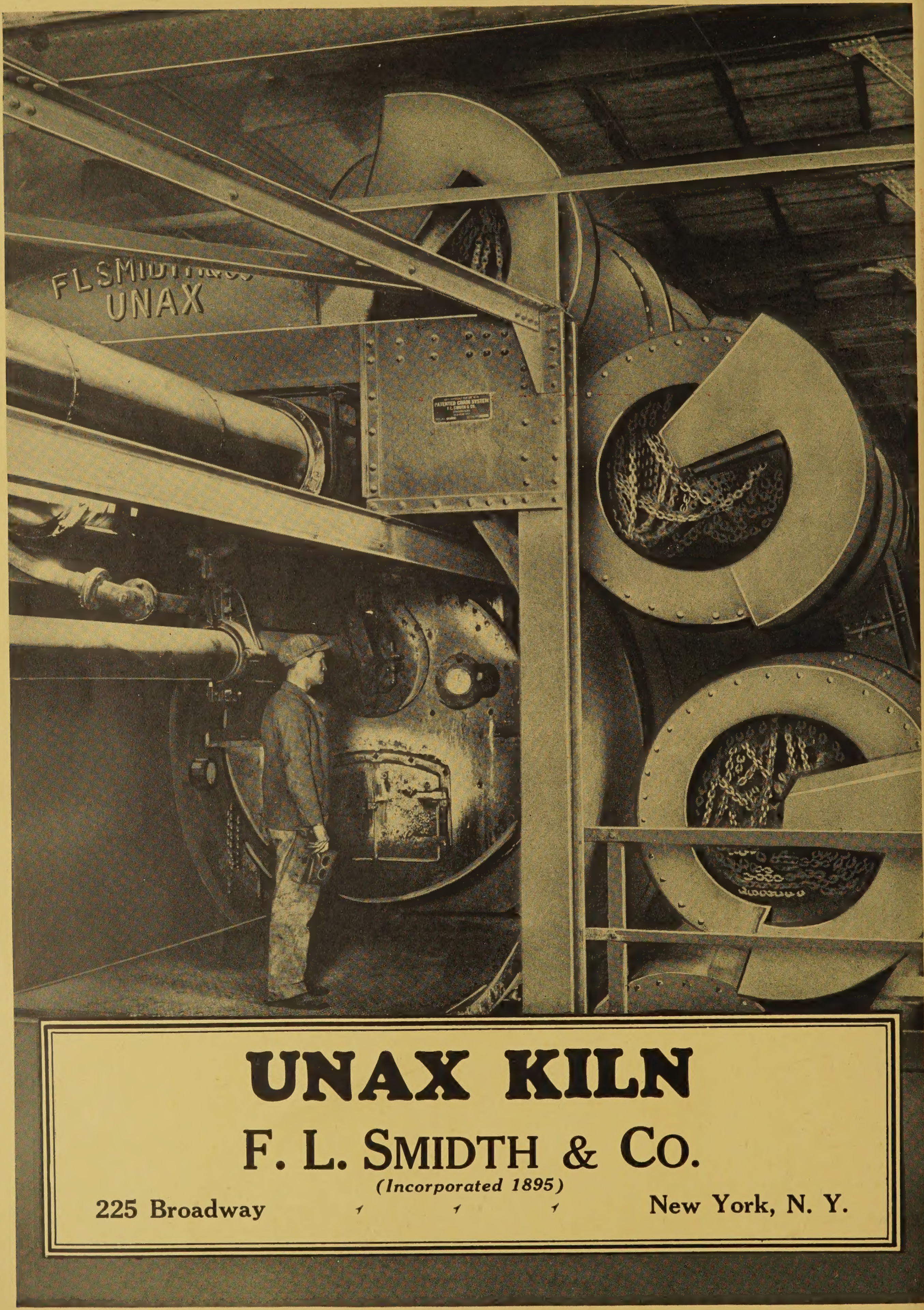

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MILL SECTION of

Concrete

The Cement Mill Edition of Concrete is edited exclusively for those interested in the manufacture of cement. Its pages are devoted to discussions of plant design, management, operation, production efficiency, chemical research and control, quarry operation, progress and news of the industry.

The Cement Mill Edition also contains all the material published in the corresponding Regular Edition and so provides news of the uses and merchandising of the materials whose manufacture is discussed in the Mill Edition. The Regular Section furnishes mill operating officials and mill executives valuable points of contact with the users of the materials they produce.

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MILL SECTION of

Concrete

Vol. 34 Chicago, May, 1929 No. 5

Electrical Investigation of the
Setting and Hardening of Rapid-Hardening Cements

By YOSOMATSU SHIMIZU

SYNOPSIS

The process of setting and hardening of the so-called "rapid-hardening cements," which are aluminous cements or super cements of the portland type, has been studied by means of the electrical resistance measurement. Two breaks—the first corresponding to the hydration of the calcium aluminate and the second to that of the calcium alumino-silicate or calcium silicate—were observed in the conductivity-time curve of aluminous cements, and only one break, which corresponds to the hydration of the calcium alumino-silicate, in that of the super cements of the portland type. From these experimental facts, the writer has come to the conclusion that calcium aluminate does not exist in the clinker of portland cement.

Editor's Note: Wherever the term "super" cement is used in this article, it must be understood to mean "special" cement, as the term is understood here. In the United States and Canada, the term "super cement" is a copyrighted name referring to portland cements to which certain additional materials have been added.

THE purpose of this paper is to report the results of the present writer's experiments on the setting and hardening of the so-called "rapid-hardening cements," which includes aluminous cements and super cements of the portland type, and to present some experimental evidence obtained relating to the constitution of these cements. The electrical resistance measurement was carried out, "Dyckerhoff Doppel" from Germany and "Rapid Hardening Ferrocrete" from England being used as the specimens of the super cements of the portland type, and "Ciment Fondu" from France and "Atlas Lumnite" from the U. S. A. as specimens of aluminous cements. It was found that the super cements of the portland type give only one break, which corresponds to the hydration of the calcium alumino-silicate or calcium silicate, and that in the case of aluminous cements, there are two breaks, the first corresponding to the hydration of the calcium aluminate, and the second to that of the calcium alumino-silicate or calcium silicate.

In determining the setting time of the two kinds of cements mentioned above, use was made of the electrical method which has already been described by the present writer.[1] The effect of temperature on the setting time of these cements has also been studied and the results compared with each other.

In this connection it may be mentioned that a microscopic study of the hydration of the rapid-hardening cements mentioned above has been carried out by T. Yoshioka and K. Kumagae.[2] The results of their various experimental tests are published in the report[3] of the Bureau of Public Works, Home Department.

Apparatus and Method of Measurement

For apparatus and method of measurement the reader is referred to an earlier publication.[4] Before beginning the experiment, the cement, the water used for gauging, and all the implements were kept at a constant temperature for at least 24 hours in an air-thermostat. The cement, gauged with the quantity of water for normal consistency, was placed at the bottom of a glass tube, and two platinum electrodes were inserted vertically into it. This combination was immersed in a thermostat kept at a constant temperature, the platinum electrodes being connected with a Kohlrausch alternating current bridge. The measuring was then begun, readings being recorded every 5 or 10 minutes. The distance between the platinum elec-

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The 8th report from the Research Institute for Iron, Steel and Other Metals. Reprinted from the Science Reports of the Tohoku Imperial University, Japan, Series 1, Vol. XVII, No. 7.

[1] Y. Shimizu, Sci. Rep., 17, (1928), 185. "Kinzoku no Kenkyu," 4, (1927), 485.

[2] T. Yoshioka and K. Kumagae, "Journ. Chem. Ind.," Japan, 30, (1927), 672.

[3] Rep. Bureau of Pub. Works, 4, (1926).

[4] Shimizu, loc. cit.

trodes and the area of the platinum plate must be so regulated that the resistance between the electrodes exceeds 100 ohms; otherwise a good sound minimum is not obtained with the telephone receiver.

Results of the Experiment

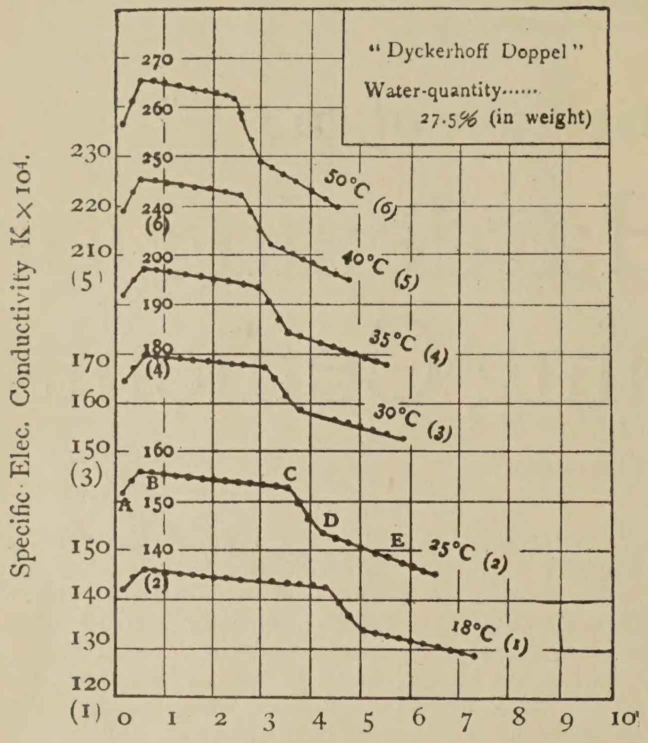

Figure 1

The "Dyckerhoff Doppel" specimen belongs to the super cement of the portland type. The chemical analysis[5] of the specimen is shown in the following table.

Sample	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	SO_3	Ignition loss
"Dyckerhoff Doppel"	20.16	3.12	5.44	63.70	2.50	1.66	2.30

The results of experiments at 18 deg., 25 deg., 30 deg., 35 deg., 40 deg., and 50 deg. are given in Fig. 1, in which the specific electrical conductivity K is taken as the ordinate, and the time from the beginning of the gauging as the abscissa. As is evident in the figure, the process of the setting is greatly accelerated with the rise of temperature.

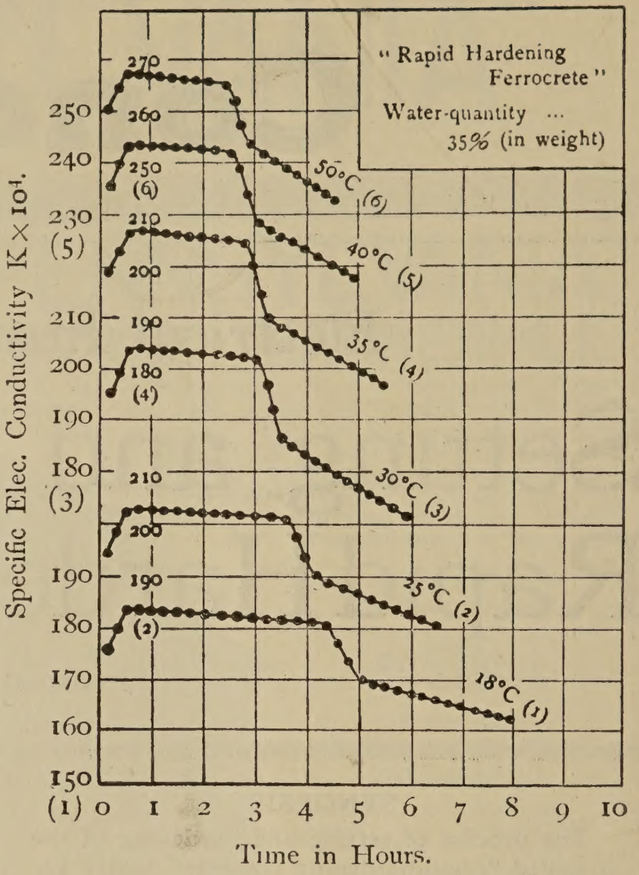

Figure 3

The setting time determined from the conductivity-time curve is shown in Table 1 and is also embodied in Fig. 2, in which the setting time is taken as the ordinate and the temperature of the material as the abscissa. The shortening of the setting time with the rise of temperature is clearly revealed. A comparison of the effect of temperature on the setting time both of this cement and of the portland cement will be described later.

TABLE 1.

Temperature (deg. C.)	18	25	30	35	40	50
Setting Time in Hours	5	4	3½	3 1/3	3¼	3 1/6

Let us consider the physical or chemical significance of the conductivity-time curve at 25 deg. given in Fig. 1, as viewed from Michælis' theory.[6] The author of the theory considers that the phenomena of the setting and hardening

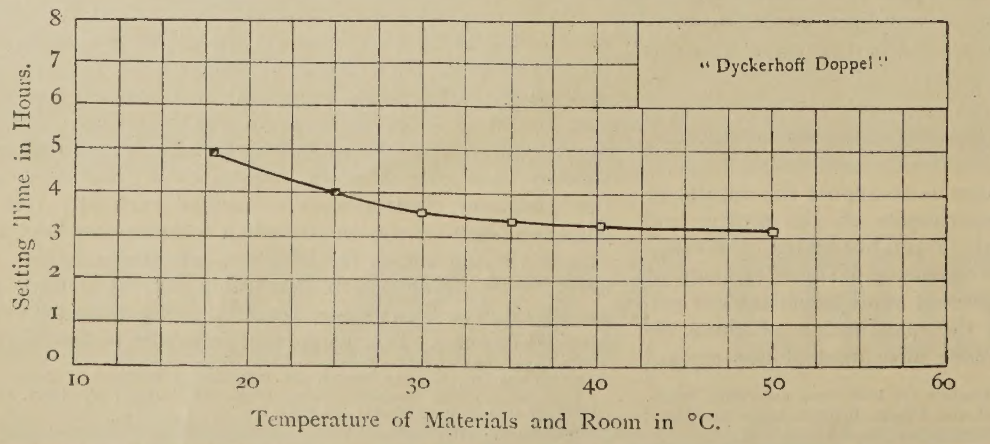

Figure 2

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[5] T. Yoshioka and K. Kumagae, loc. cit.

[6] W. Michaelis, "Kolloid-Z.," 5, (1909), 14.

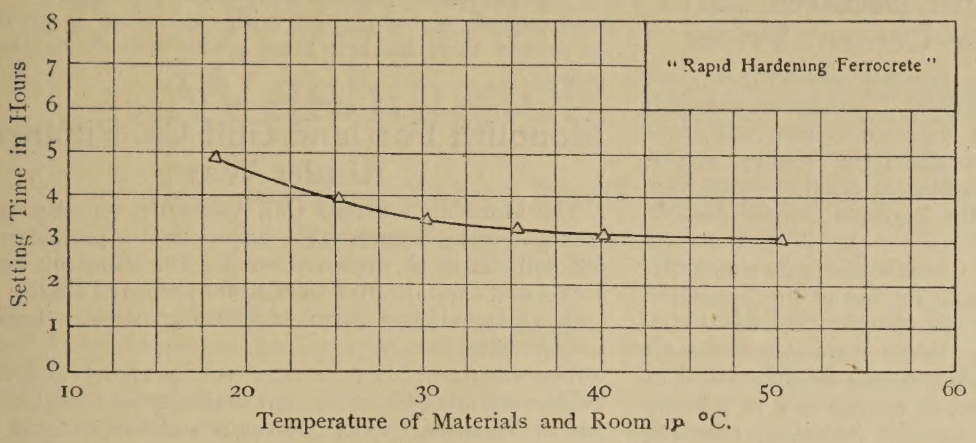

Figure 4

are colloid-chemical reactions. According to this theory, the initial ascending portion of the curve *AB* in the conductivity-time curve is probably to be considered as corresponding to the so-called "sol" state; that is, when the cement is gauged with water, the particles of the cement are dissolved from its surface into water and the supersaturated solution is formed with the dissolved matter. The next branch *BC*, which shows a slight decrease of the electrical conductivity with time, probably corresponds to the state of colloidation, in which new solid matter is separated from the supersaturated solution. The next portion *CD*, which shows a rapid and marked decrease of the electrical conductivity, also accompanying rapid heat evolution,[7] probably indicates the formation of colloidal hydrated calcium aluminosilicate, or hydrated calcium silicate, together with calcium hydroxide, say, by the following chemical reaction,

$$8\,CaO.2SiO_2AlO_3 + aq. =$$
$$(8-x)\,CaO.2SiO_2.Al_2O_3.H_2O + xCa(OH)_2,$$

or

$$3CaO.SiO_2 + aq. = CaO.SiO_2.xH_2O + 2Ca(OH)_2.$$

The last portion *DE*, in which the electrical conductivity continues to decrease slightly with time, probably corresponds to the stage in which the hardening gradually progresses. It has already been shown[8] that taking the electrical conductivity as the ordinate and the time in days as the abscissa, the curve falls gradually. To describe the process in greater detail, the gel thus produced forms a coating around the cement particles, preventing further access of water to them except by diffusion through the colloidal coating, and then the reaction continues slowly, more and more of the calcium alumino-silicate or calcium silicate being hydrolyzed and the lime set free is absorbed by the gel, which thereby increases gradually in density and hardness and loses its plastic quality. The water at first retained by the gel is used up in this process of hydrolysis, and the gradual dehydration of the gel, which takes place even when the cement is immersed in water, brings about the gradual hardening of the mass.

The "Rapid Hardening Ferrocrete" specimen belongs to the super cement of the portland type. The chemical analysis[9] of the specimen is shown in the following table.

Sample	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	SO_3	Ignition loss
"Rapid Hardening Ferrocrete"	20.42	2.21	7.24	64.70	1.44	1.89	1.20

The results of experiments at 18 deg., 25 deg., 30 deg., 35 deg., 40 deg., and 50 deg. are given in Fig. 3; the curves have the same meaning as in Fig. 1. This conductivity-time curve is analogous to that in the case of the "Dyckerhoff Doppel." The processes of the setting are greatly accelerated with rise of temperature. Setting time determined from the conductivity-time curve is given in Fig. 4, where the setting time is taken as the ordinate and

(Continued on Page 125)

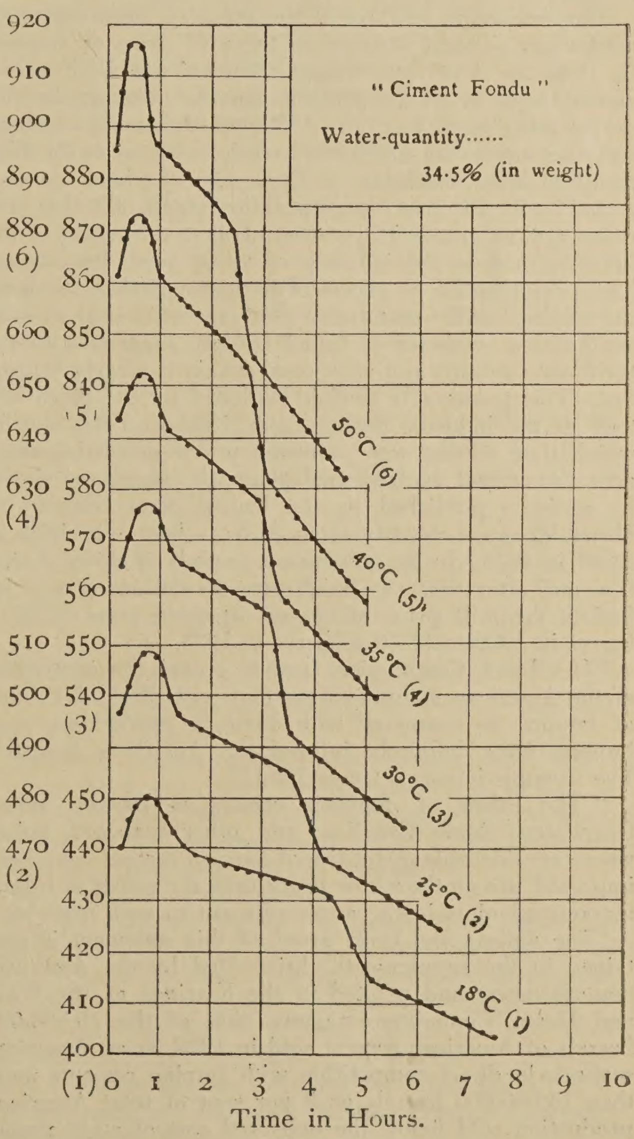

Figure 5

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[7] Gary and Stradling, "Conc. and Const. Eng.," 1, (1907), 356, 432.

[8] Shimizu, loc. cit.

[9] T. Yoshioka and K. Kumagae, loc. cit.

Statement by Smith Declares Tariff Would Not Raise Cement Prices

A study of the American cement industry just completed by the United States Tariff Commission definitely refutes the assertion that a duty on cement will raise American cement prices throughout the country, according to Frank H. Smith, president of the Lawrence Portland Cement Company and the Portland Cement Association.

"The finding of the Tariff Commission in its summaries of tariff information just issued for use of the Committee on Ways and Means," said Mr. Smith, "definitely confirms the statement American cement manufacturers made to the Ways and Means Committee that the duty asked on cement could not be reflected in an increase in price to the consumer except to permit the American manufacturer to sell his cement at a reasonable price in markets where he is now forced to sell below his cost of production in an attempt to meet foreign competition.

"On page 2264 of the printed summary of tariff information, the Commission says:

" 'Portland cement is sold in keen competition between domestic producers in most localities. The mills in various sections which ordinarily supply the large markets at seaboard points also compete at such points with foreign cement imported largely from Belgium.'

"The economic position of the industry absolutely precludes any general increase in the mill price of cement. In 1928 the American cement industry was built to an annual capacity of 227,080,000 barrels. The production on the other hand was only 173,206,513 barrels which in turn was more than 1,000,000 barrels in excess of its shipments to home markets. As these cement plants are operated by 94 different companies, the largest of which produces approximately 10 per cent of the total output of the industry, and as the industry in recent years has always had a capacity far in excess of its home market, the finding of the Tariff Commission that cement is sold in keen competition is obviously sound and the suggestion that a tariff duty would limit such competition is clearly injustified. This position is further exploded by the price history of the industry itself. From 1890 to 1913, during which time cement was protected under successive tariff acts, the annual average mill price for cement, as shown by statistics published by the United States Bureau of Mines, dropped steadily from $1.67 a barrel in 1896 to $1.01 in 1913. In the subsequent periods of underprotection and after the price readjustments following war inflation, the mill price of cement dropped from $2.02 a barrel in 1920 to $1.60 a barrel in 1928.

"The Tariff Commission further proves the contention of the American manufacturers that regardless of volume of imports as compared with domestic production, such imports have definitely injured the American industry. The Commission says (page 2264):

" 'The prices of domestic cement at Boston, Mass., Charleston, South Carolina, and other seaboard points where considerable quantities of foreign cement have been imported, are on the whole lower than the prices at inland marketing points in the areas adjacent to such markets.'

"The dollars and cents proof of this statement is contained in the supplemental brief filed by the American manufacturers and printed in the hearings of the Ways and Means Committee—namely, that of the 18,500,000 barrels of American cement sold in 1928, at an American seaport, in direct competition with foreign cements more than 14,000,000 barrels or 8 per cent of total American production sold below the delivered cost of such cement in such markets, and that 48 per cent of the American mills shipping to seaport markets in 1928 shipped at a loss because of competition with each other in an effort to protect their markets from going entirely to foreign cement."

Monolith Portland Gulf Co. Financing Under Way

The Monolith Portland Gulf Company, recently organized under the Nevada laws, has secured a permit to sell 585,000 shares of preferred stock. The company has an authorized capitalization of 600,000 preferred shares, each with a par value of $10, and 700,000 common shares of no par value.

The company plans to take over property and leaseholds containing limestone and shale deposits located near and in Arkansas, Copano, Mesquite and San Antonio bays near Aransas Pass, Texas, where the plant will be established.

The company's officers are Coy Burnett, J. J. Calkins, and Carrol A. Low, also of the Monolith Portland Cement and the Midwest companies.

The Monolith Portland was recently given permission by California's corporation commissioner to change the capitalization of the company, necessitated by the acquisition of the Monolith Portland Midwest. An issue of $1,000,000 first mortgage 6 per cent bonds and an increase in the number of common shares to 250,000 from 150,000 were authorized. None of the additional shares was sold to the public, it was announced.

Huron to Install Second Kiln In Less Than Year

The Huron Portland Cement Company is anticipating an increase in the production of fine limestone from the Michigan alkali quarry at Alpena, Michigan, which in turn necessitates an increase in equipment capacity.

Late in the fall of 1928 a rotary kiln of 2,000 barrel daily capacity was purchased and will be placed in operation in the near future. A second new kiln has now been determined upon and will be shipped and installed as soon as possible.

Marquette Prepares to Handle Bulk Cement at Missouri Plant

The Marquette Cement Manufacturing Company, Chicago, has let contracts for the construction of a series of silos at its plant at Cape Girardeau, Missouri, and for the building of three 175-ft. barges. About $300,000 will be expended.

This construction is in furtherance of Marquette's plan to transport cement in bulk from its plant to St. Louis, where it will be distributed.

Peerless-Egyptian Increases Capacity

Improvements completed about April 1st at the plant of the Peerless-Egyptian Cement Company at Port Huron, Mich., have increased its capacity about 10 per cent. The work included two buildings and two correction tanks, costing about $112,000.

New Nevada Company Seeks California Market

The Port Stockton Cement Company, Carson City, Nevada, financed by the issuance of 1,350,000 shares of no-par value stock, has filed papers seeking permission to do business in California.

Regional Safety Meetings at Washington and Albany

More Regional Safety Meetings Build Up Enthusiasm for Better Safety Records in Cement Plants

THE Portland Cement Association held another successful regional safety meeting at Washington, D. C., on Tuesday, April 2nd, for the five cement mills located in the vicinity of Chesapeake Bay. The sessions were held at the Lee House and a large delegation from each of the following plants was in attendance:

Lehigh Portland Cement Company at Fordwick, Va., and Union Bridge, Md.; Lone Star Cement Company Virginia at Norfolk; Medusa Portland Cement Company, York, Pa.; North American Cement Corporation cement mill at Hagerstown and lime plant at Martinsburg.

Wm. Moeller, general superintendent, Eastern Division, International Cement Corporation, acted as chairman, and Major Henry A. Reninger of the Lehigh Portland Cement Company, who is president of the National Safety Council, conducted the round table discussions. D. Harrington, chief engineer of the U. S. Bureau of Mines, described the program in first aid training now in progress throughout the industry.

Program

The program was as follows:

Morning Session—"Safety Progress in the Cement Industry," A. J. R. Curtis, Portland Cement Association; "How to Sell Safety to the Employees," A. R. Couchman, Safety Director, North American Cement Corporation; "Eliminate Small Accidents and the Big Ones Stop," G. F. Martinez, Supt., Lone Star Cement Company Virginia.

Luncheon—Chairman, A. R. Couchman; address by O. J. Smith, Chief Rating Engineer, U. S. Casualty Company.

Afternoon—"First Aid and Safety," D. Harrington, Chief Engineer, Safety Division, U. S. Bureau of Mines. Round Table discussion conducted by Henry A. Reninger (Lehigh) and led by the following: H. H. Leh, Supt., Lone Star Cement Co. (Pa.), Quarry and Crusher Accidents; George S. La Forge, Supt., Lehigh Portland Cement Co., Union Bridge, Md., Mill Accidents; Wm. M. Powell, Safety Director, Medusa Portland Cement Co., Cleveland, Power and Electrical Accidents; H. A. Johnson, Supt., Lehigh Portland Cement Co., Fordwick, Va., Packing and Shipping Accidents; E. S. Guth, Dist. Mgr., North American Cement Corp., Hagerstown, Md., Railroad and Yard Accidents.

Dinner—Toastmaster, Dwight Morgan, Vice-President, Lone Star Cement Co., Virginia; address, Col. G. B. Strickler, Consulting Engr., Washington, D. C.

Trend of Accidents

Mr. Curtis, in discussing the trend of cement mill accidents, spoke in part as follows:

"As a group vitally interested in reducing personal injury accidents in the cement mills, we have a big job ahead of us, perhaps more difficult than anything we have faced in the past. While the cement mills of America are making a wonderful record so far as the reduction of accident frequency is concerned, there are beginning to appear unmistakable signs of an increase in the severity of our accidents.

"The number of cement mill accidents has declined so precipitately that the record has become both outstanding and spectacular. Our average monthly accident rate for the entire group of mills reporting to the association has declined from 261 in 1924 to 88 in 1928 and for the first two months of 1929 it was only 52. But what is that going to avail us, if the severity of our mishaps, in terms of days lost, permanent disabilities and death, goes up? This is exactly what is happening. I want you to appreciate and to become fully alarmed at this trend. It means that the character of our accidents is changing. It seems to tell us that while we have succeeded in raising the level of intelligence to the point where men are avoiding the less dangerous types of accident, there is yet a tremendous task ahead of us to educate the workmen away from accidents which lead to the more severe injuries.

"The situation which seems to be ahead presents a challenge to every superintendent, safety director and foreman. There is no opportunity for you to offer an alibi. There can be none. As accident preventives alibis are no good anyway. The level of intelligence in our operating organizations simply hasn't been equal to the demands placed upon them by a heavy program of new construction and rebuilding, new and sometimes larger machinery and the necessity for producing more cement per manhour, forced on our industry by stern economic necessity."

Albany Meeting Surpasses Last Year

The eighth meeting of the regional safety series by the Portland Cement Association was held at Hotel Ten Eyck, Albany, on April 16. It was attended by representatives of the following mills:

Alpha Portland Cement Company, Cementon and Jamesville, New York; Atlas Portland Cement Company, Hudson, N. Y.; Canada Cement Co., Ltd., Montreal, Quebec, Canada; Glens Falls Portland Cement Co., Glens Falls, N. Y.; Lone Star Cement Co., New York, Inc., Hudson, N. Y.; North American Cement Corp., Catskill and Howes Cave, New York; Pennsylvania-Dixie Cement Corp., Portland Point, N. Y.

Charles S. Andres, superintendent of Lone Star Cement Co., New York, Inc., acted as chairman; R. B. Fortuin of the Pennsylvania-Dixie Cement Corp. as luncheon chairman; and D. P. Cooper, vice-president of the Lone Star Cement Co., New York, Inc., as toastmaster.

The program was as follows:

Morning Session—"Report on Safety Work in the Cement Industry in 1928," A. J. R. Curtis; "Industrial Hygiene," John N. McDowell, Division of Industrial Hygiene, N. Y. State Dept. of Labor; "Material Handling," H. W. Gabor, safety engineer, N. Y. State Insurance Fund; "Accident Prevention and Job Safety," F. W. Kelley, president, North American Cement Corporation; "New Ideas," J. D. Harnden, assistant manager, General Electric Company, Schenectady, N. Y.

Luncheon—Chairman, R. B. Fortuin, assistant to general manager, Penn-Dixie Cement Corp.; address by E. C. Spring, Lehigh Valley Transit Company, Allentown, Pa.

Afternoon Session—"First Aid Team Work," R. D. Currie, U. S. Bureau of Mines; First Aid Competition, judge, R. D. Currie, U. S. Bureau of Mines; Round Table discussion conducted by A. G. Beck, Supt., Canada Cement Co., Ltd., Montreal, Que.

Dinner—Toastmaster, D. P. Cooper, vice-president, Lone Star Cement Co., N. Y., Inc.; address, Dr. R. M. Little, N. Y. State Dept. of Education.

Health and Accidents in Industry

A Safety Paper from the Doctor's Point of View, Presented at the Mason City, Iowa, Regional Safety Meeting, March 20

By DR. T. E. DAVIDSON

Chief of Staff, Park Hospital Clinic, Mason City, Iowa. Medical Staff, Lehigh Portland Cement Co.

THE industrial safety movement in America is about 20 years old. It started when a few far-sighted employers came to the conclusion that accidents were wasteful and they could be prevented by a definite campaign of education combined with mechanical safeguards. This has extended further within recent years to the public because of the increase in automobile accidents. Our public schools have in their curriculum a course in safety.

In 1927 the total accident fatalities in the United States numbered 95,500. Of these 25,800 were due to some form of motor vehicle accidents and 25,000 to industrial accidents, so it is time to think of other things besides industrial accidents.

A great deal is being said and done for prevention of accidents in the manner of warning employees of danger and placing guards on machinery where there is most danger. Perhaps we are beginning to think we have done all we can do to prevent accidents. Most of us have heard the story of the young patent office clerk who resigned because he could see no future in the patent office because all the great discoveries had been made. That was in 1867, according to the story. What has taken place since then I'll allow you to judge.

Improve Health as Safety Measure

We can go one step further in our well organized plan of safety work by improving the health of the employee. It is true this is a public health measure but it is to your interest to sponsor such a movement and engage a company physician if you have none as well as the local public health authorities. Approximately 90 per cent of industrial organizations are doing for their employees only what is required by law caring for injuries.

Sickness is a far greater cause of industrial inefficiency spoilage, absenteeism, labor turnovers and financial loss in general than injuries.

In the words of a leading health authority, "For every industrial disability needing surgical attention there are probably ten or more cases needing medical investigation."

Quinley in reporting the absentee experience of the Hood Rubber Company, found that the accident rate was nine times as great in women rated as third class by physical examination compared with those in the first class. In men the third class showed nearly double the accident rate as the second class. These findings were observed in spite of the precautionary measure of special placement of third class persons in occupations involving low accident risk.

A survey of the minor illness experience of many large groups has shown that colds, headaches, gastro-intestinal complaints, tonsilitis, neuritis, neuralgia, and rheumatism are common types of indisposition and occur in much greater number than the more serious kinds of physical disability. These conditions are too frequently the cause of inattention, depression and preoccupation to the extent that physical injury is brought about to the worker.

Hackett has shown that sickness was responsible for 60 per cent of absenteeism while accidents were the cause of only 15 per cent. Fatigue has been called the universal occupational disease. It is common to every occupation, including housekeeping, and it is even possible to get quite tired from loafing.

When Accidents Occur

Accidents occur most frequently on Mondays because of a certain amount of spirituous relaxation during the week end rendering the worker more liable to accidents. During the week they occur in the early morning after loss of sleep or late in the day when greatly fatigued or hurrying to finish some work before closing time. Carelessness is reported by many as a minor cause for accidents. Domestic and financial trouble, gambling or any general mind wandering contribute to the happening of an accident. The time will no doubt come when the chief hazardous processes in industry will be analyzed with a view to setting standards of mental alertness and capacity required and the inauguration of brief mental testing procedures to establish the presence of the minimum requirements in any given individual. For example, the serious situation of placing a person with a "slow reaction time" on a job necessitating quick and adequate motor responses. The average industrial worker is in the industrial environment only 30 to 35 per cent of his time, the balance of which is his to do with as he wishes. Surely, the sixteen hours or more that he spends outside the plant must have some influence on his health and welfare.

An industrial worker who has been badly born, badly fed and reared, who has the scars of epidemic infection in his body, who harbors foci of chronic infection and sources of continuous bodily poison and who has no knowledge of proper personal hygiene, is beyond the reach of any law or regulation or practice affecting merely his environment and working conditions. With the facts confronting the employer as to industrial waste and the employee as to his missed opportunities in life and his needless burden of sickness and loss of work, we may now count on the more rapid development of remedial measures and particularly on the fundamental measure which has been so widely endorsed in principle by the medical profession in the last few years—the periodic health examination.

A company physician can increase his usefulness to industry by caring for these minor ailments as well as advising the employee of necessary treatment as well as rejecting any person who is a potential risk. I recall a case of chronic osteomyelitis that was employed at one of our industrial plants, who received a minor injury to the diseased area and produced an acute condition costing the company several hundred dollars in compensation and medical services. Had the company required preliminary physical examinations, this could have been avoided.

Poor eyesight causes a large number of accidents. I know of one case of cataract employed by one of our plants. Being placed in a dark room and expected to see normal, got caught between two cakes of ice and received a compound fracture of one of his legs. A year and a half elapsed before he returned to work.

Infections

During 1927 approximately ten per cent of all lost time accidents were due to infections. The employee should report all accidents regardless of how trivial to the first aid station immediately, the more serious ones being referred to the physician after a sterile dressing has been applied. I would like to emphasize that scrubbing a wound with soap and water is the worst thing that can be done although one of our insurance companies advocate this treatment. For myself I would rather have a wound with a sterile dressing over it and no antiseptic used than to have one that has been probed to its depth with antiseptic. There has never been discovered and probably there will never be discovered an antiseptic for wounds as efficient as blood and lymph or serum. Any antiseptic which is strong enough to kill bacteria causes a certain amount of damage to wounded tissue. Superficial wounds and scratches should be treated with an antiseptic solution and sterile dressings applied. No further care is necessary except changing the sterile dressings, keeping out the dirt until the wound is completely healed. If infection should set in, hot fomentations by soaking the infected part in hot water or flannels wrung out in hot water.

Bruises to the nail with hemorrhage beneath should be punctured as soon as possible and the blood allowed to escape. If allowed to remain it becomes painful and a good source for infection. Puncture wounds should be explored to the depth of the wound with carbolic acid and antitetanic serum administered.

Eye Injuries

Injuries to the eyes, regardless of source, should be referred to the physician immediately after irrigating with clear hot water or boric acid solution. Any injury to the eye, regardless of how simple, if not treated properly may result in an ulcer and impairment of vision, especially if the condition is not treated early.

For the sterilization of skin about wounds, the tincture of iodine is most effective of any antiseptic. Mercurochrome 220 soluble is not effective in disinfection of the unbroken skin because it contains no fat solvents and therefore does not penetrate through the oil of the skin. We have an alcohol acetone aqueous solution of mercurochrome that is very efficient and not as irritating as iodine.

In about half of the wounds I see where there has been profuse bleeding, I approximate the skin edges if possible and use no antiseptic and have no more infections than in the ones treated with antiseptics. I believe there is such a thing as overtreating wounds and all we can hope to do is assist Nature.

Ultimately this matter of preventing human injuries and reporting and caring for wounds is a moral enterprise. The majority of accidents as well as infections can be prevented in any case. Ignorance, inattention and willfulness cause the great majority.

Chemical Exposition Has Students' Course

In addition to exhibiting machinery and equipment of many types, the Twelfth Exposition of Chemical Industries will conduct its customary students' course on the fundamentals of industrial chemistry and chemical engineering practice. The exposition itself is open from May 6th to 11th inclusive, from 12 M. to 10:30 P. M., at the Grand Central Palace, New York City.

The students' course, or professional sessions, will be held each morning under the chairmanship of Professor W. T. Reed of the Texas Technological College. Admission to classes will be without charge but by special registration. The sessions of particular interest are those on the subject of disintegration, mechanical separation, separation with phase change, and process control. The first of these will be covered by a talk by Lincoln T. Work, on "Grinding"; the second by Everett P. Partridge, on "Dust Collection"; by Arthur Wright on "Filtration," and by H. L. Olin on "Filter Aids: Their Nature and Use." Under the subject of separation with phase change is scheduled a talk by Philip DeWolf on "Evaporation."

Consolidated Plant Prepares to Use Marl

In preparing to handle marl deposits by boat, the Peninsular plant of the Consolidated Cement Corporation at Cement City, Michigan, is now building a dredge, two tug boats and a scow at Silver Lake, Michigan, as well as laying foundation for a terminal building for the pipeline on the lake shore. The dredge will dip the marl from the lake bottom, where the deposit is 5 to 25 ft. deep. Loaded on a scow the tugs will take it to the terminal building where an unloading derrick will dump the marl through screens. It will then be pumped through a 12-in. pipeline two miles to the plant. Two relay pumping stations will be maintained along the line.

Place Superior Portland Cement Earnings at $800,000

Estimates made of Superior Portland Cement Incorporated's 1928 earnings place them at considerably more than $800,000.

Under the company's recent dividend policy, dividends on the "A" and "B" stocks amount to approximately $368,000 annually.

Bessemer Shares Earn $3.62 During 1928

The Bessemer Limestone and Cement Company reports for 1928 a net profit of $543,201, after interest and federal taxes, equivalent to $3.62 a share earned on the combined 50,000 no-par shares of Class A and the 100,000 no-par shares of Class B stocks.

Hermitage Purchases Control of Cumberland Portland

Munday and Hampton Take Over Davidson-Hicks-Greene Interests in Nashville Company; Plant Located at Cowan

Control of the $4,000,000 Cumberland Portland Cement Company at Nashville, Tenn., with a plant at Cowan, was taken over on March 23rd by M. C. Munday, of Knoxville, and E. L. Hampton, of Nashville, from the Davidson-Hicks-Greene Company.

At a board of directors meeting on that day plans for reorganization were completed and new members were named to succeed W. V. Davidson, president; J. R. Greene, vice-president; C. V. Hicks, secretary-treasurer, and B. G. Hicks, whose former control in the company was purchased.

New officers elected were Mr. Munday, president and general manager; Mr. Hampton, active first vice-president; R. T. Miller, second vice-president, and A. N. Trice, secretary and treasurer.

The new board includes the new officers and Vance J. Alexander, vice-president of the American National bank, Nashville; J. N. Hutton, of Caldwell & Company, Nashville; James Miller of the Fourth & First National bank, Nashville; J. R. Tubbs, lumberman of Sparta; G. A. Maxwell of the Putnam Overall Company, Murfreesboro; J. H. Northcutt, merchant of Altamont; Telfair Hodgson, treasurer of the University of the South, Sewanee; Frank Pearson, of Cowan; George Cordell, of Nashville; L. C. Munday, Knoxville, city councilman, and F. J. Jones of the Knoxville Railway & Light company.

With the acquisition of this interest, Mr. Munday becomes president of two leading cement plants, the Hermitage and the Cumberland, which will remain separate and competitive in the field, although co-operating in sales affected by freight rates. The corporation will be actively managed by Mr. Munday.

In the reorganized corporation there is $2,000,000 of preferred stock and $2,000,000 common stock. The Cowan plant, built at a cost of $1,600,000, is located on the 11,000-acre tract of land on which the timber operations of Davidson-Hicks and Greene were centered for several years, and is adjacent to the Nashville, Chattanooga & St. Louis railroad line in Franklin county. It has been in operation for the past year.

Capacity of the large unit is 800,000 barrels of cement a year, operating 24 hours a day with between 200 and 300 men employed.

The Cumberland plant is similar in all details to the Hermitage plant. The latter company has $3,000,000 authorized capitalization.

Sales office of the Cumberland corporation will be maintained in the Fourth and First National bank building at Nashville.

Forecast of Future Midwest Business Activity

The volume of business activity in mid-west territory in the second quarter of 1929 will be approximately 18 per cent greater than in the corresponding months last year, according to advance forecasts of revenue freight car loadings made by the various commodity committees comprising the Mid-West Shippers' Advisory Board. The territory included in these forecasts covers the states of Illinois, Iowa and Wisconsin, northern Michigan and western Indiana.

In this territory in the second quarter of 1928, 1,089,000 cars were loaded with the 26 principal agricultural and industrial products listed in the forecast. In the months of April, May and June of this year it is anticipated that the movement of these same commodities in this same territory will require 1,280,000 freight cars, an increase of 191,000 cars, or of approximately 18 per cent above the second quarter of 1928.

Comparing April, May and June, 1929, with the same months a year ago, increases are anticipated in the movement of various commodities from mid-west territory. An increase of 10 per cent is forecast for the movement of cement. There will be an increase of 67 per cent in the movement of coal and coke, this increase being partially explained by the fact that in the second quarter of 1928 coal movement in this territory was exceedingly light on account of the heavy storage movement in the early months of the year.

A volume of business approximately equal to that done in the second quarter of 1928 is anticipated in the movement of salt and of fertilizers.

The total percentage of increase—approximately 18 per cent—forecast by the Mid-West Advisory Board for the second quarter of 1929, as compared with the same months of 1928, is the highest percentage of increase reported by any of the thirteen Shippers' Advisory Boards which cover the entire country.

Proposes Sale of State's "White Elephant" Plant

Proposing the sale of the Chelsea cement plant of the state of Michigan, at Chelsea, but warning the legislature of the possibility of increased cement prices if the plant is removed from competition, Governor Fred W. Green in a message to that body on April 1st gave the final report on the "white elephant."

The only object, the governor stated, of keeping the plant in operation is to furnish employment for 200 convicts and to keep a curb on cement prices.

A bill advocating that the state administrative board be authorized to sell the plant for not less than $750,000 was subsequently introduced. Its passage is believed to be certain.

Pacific Portland Common Stock Earnings $4.62 a Share

The annual report of the Pacific Portland Cement Company, San Francisco, Calif., shows a gross of $1,505,000 and net available to dividends, $836,534. The surplus at the end of 1928 was $1,101,000. Earnings amounted to $4.62 a share on the 82,500 shares of common, after deduction of preferred dividends of $454,770.

Its statement as of December 31, 1928, showed current assets of $2,659,000 and current liabilities of $487,000. The company paid off $700,000 notes in 1928 and retired $100,000 on bonds.

Buys Maryland Tract

According to an abridged report emanating from Annapolis, Md., Norman R. Bell, unidentified as to company and address, has purchased a tract of land on which he will erect a cement plant. The property fronts on a city dock.

Report on Atlas Plant

Construction of the new Atlas Portland Cement Company plant at Waco, Texas, has attained the storage silo stage. The unit will consist of a battery of eight, 80 ft. high. C. A. Wallstedt is superintendent of construction.

~ EDITORIAL ~

One Standard for Cement?

IN a recent conversation with a cement manufacturer the statement was made that it would not be difficult to gather fifty different cement specifications that are now being used in the territory covered by that manufacturer

If that is the case, we have surely departed a long way from a single standard specification and we are fast returning to a condition similar to that which existed before a standard specification for cement was adopted. It may well be asked—of what use is a standard specification when, in spite of its existence, engineers feel that they must amplify it or modify it or even write an entirely new specification for the work they have in hand?

The fact that these specifications are being written and are being used as a basis for purchasing cement, clearly indicates that the writers of the specifications are seeking some quality in the cement they purchase that is not covered in the standard specifications. Because this quality is sought and there is no standard specification covering it, the engineer has no recourse but to write his own specification.

With the diversification in cement that now seems to be the order of the day, there may be several additional qualities (either real or imagined) that the purchaser may want in addition to those indicated by the standard specifications. But, putting aside such special requirements as watertightness, plasticity, etc., it is significant that the primary reason for practically all of these special specifications is to incorporate some provision for securing high early strength. Individual requirements may vary as to the time at which certain strengths are specified, yet they all exceed the standard specification requirements in this regard.

Here is the primary cause for the existence of these extra-special specifications. Lacking a standard specification covering high early strength, the purchaser writes his own and the result is a return to the fifty-seven varieties. Instead of having, say, two or three standard specifications, the manufacturer must contend with fifty! And the end is not yet. As one manufacturer expressed it, "we will soon be having the entire Lehigh Valley dotted with cement storage silos."

There can be no question but that high early strength cement is here to stay. Why, then, make it necessary for purchasers to write specifications covering high early strength cement? Can not the cement industry as a whole face the situation frankly and through co-operative effort again secure the advantages of standardization?

It is no longer possible, in the light of developments that have already taken place, to serve the country with a single standard specification. But need there be fifty specifications? Perhaps two or three standards—one as at present, another covering three- or four-day cement and another covering twenty-four-hour cement—would meet all the needs of the user and would relieve him of the necessity of writing a special specification for his job.

The fact is that we now have in actual force a great number of specifications. By adopting another or even two more standard specifications we would not increase, but would actually decrease the number of specifications that the cement manufacturer would be required to meet. The need for standardization has again returned.

Achieving the Impossible

AGAIN, at sunrise on June 1st, a specially designed no-accident flag will fly under the national flag on the flagstaffs of 156 cement plants in the United States and Canada and an entire industry will make a supreme effort to operate throughout the month without a single lost-time accident. The challenge has been sounded and the cement industry has accepted it!

Is it impossible? Only if we believe it is. Many so-called impossibilities have been accomplished. The fact that no undertaking of similar magnitude has ever been achieved before should act only as an added incentive to success.

In no previous campaign has the June no-accident effort been undertaken with such assurances of success. Preparation has been better than ever before. Using the same methods that were so effective last year, but applying them much more thoroughly, better results are inevitable. With one accord the executives of the cement companies have gotten behind the movement and added their earnest efforts. Even cold statistics indicate success, for if the accident curve of previous June campaigns were extended to June, 1929, it would fall below the zero mark.

Here is a challenge worthy of so great an industry. The signs point toward success. It ***can*** be done.

Seek to Jail Pacific Coast Cement Men for Contempt

Members of Eight Companies Charged with Refusal to Answer Questions of State Senate Cement Trust Investigating Committee

A resolution seeking to order the arrest of ten executives of California cement companies for refusal to answer questions and produce evidence for the special state Senate committee investigating rumors of a cement trust, was passed by the Senate on March 14th, according to newspaper reports.

Eight of the officials subsequently on March 26th appeared at the offices of the attorney general, when they were formally taken into custody and then immediately released, at $1,000 bail each. Writs of habeas corpus were issued by the Supreme court.

Those involved are Wm. H. George, secretary, manager and sales manager of the Cowell Portland Cement Company; George R. Gay, manager of the Santa Cruz Portland Cement Company, all of San Francisco; E. E. Duque, unidentified; John Treanor, vice-president and manager of the Golden State and Riverside Portland Cement companies; C. C. Merrill, vice-president of the Southwestern Portland Cement Company; Carroll A. Low, sales manager, Monolith Portland Cement Company, all of Los Angeles; Arthur Shelby, unidentified; A. Emory Wishon, president of the Yosemite Portland Cement Company, Fresno, Calif., and Harry T. Battelle, secretary of the Pacific Portland Cement Company.

The Senate resolution finding the men in contempt, and which is self-executing as warrant of arrest, was to be served March 19th. Over the objection of a majority of the Senate Judiciary Committee, which is composed entirely of attorneys, the resolution was passed, although it was admitted that there was doubt as to the materiality of the questions asked the witnesses and the scope of the original resolution creating the inquisitorial committee.

Although he voted for the contempt resolution, a San Francisco senator took the floor to point out that "It is not the business of the legislature to determine whether a profit is reasonable; that is a question which is one of opinion."

Counsel for the men declared in contempt indicated that they will carry their case to the courts immediately. In a hearing before judiciary committee, attorneys for the cement interests are said to have declared that if the special committee, in the course of a legislative investigation during which no legally sufficient evidence of an unlawful combination has been produced, has the power to compel the production of all private records called for, and to compel witnesses to answer the questions which have been put to them, then there remains in the state no guarantee for the protection of private rights whatsoever.

The refusal of the men in question to answer most of the questions asked them was based upon the contention that they were irrelevant to the scope of the investigation unless and until the special committee obtained some evidence of the existence of an unlawful combine.

Many of the senators are said to have accepted the view of the attorneys for the ten men that no combination in violation of the law had been established and that as a consequence the issue of the subpoenas were a "mere dragnet in the course of a fishing expedition" and as such violated federal and state constitutions.

Under the resolution approved by the Senate on March 14th, the men in question may purge themselves of the contempt by answering all questions propounded to them by the committee and by producing their business records and books.

Canada Co. Acquires Land for Another Plant; Report on Maritime Progress

The Canada Cement Company has made an important purchase of property fronting on the harbor at St. John, N. B., Canada. Three different and adjoining properties are involved in the sale, which was made by the Bank of Nova Scotia, C. B. D'Arcy, Edith Gossens, et. al., to the cement manufacturing firm, which has its headquarters at Montreal.

The main piece of the property was occupied for many years by a rolling mill. The properties will be cleared of the encumbering buildings and several new structures erected on the site. Part of the newly acquired land was a shipyard for many years. A wharf will be built to accommodate steamers and sailing vessels, and shipments of the cement will be made chiefly by water, because of the lower freight rates. However, the railroad is only 50 yards from the recently purchased properties.

J. D. Johnson, general manager of the Canada Cement Company, was active in the acquisition of the St. John properties, and will supervise the improvements that are to be made there. Indications are that a start in construction of the plant that will be built on the shore will be made during the early summer.

This will be the second cement plant to be established in the St. John section this year. The Maritime Cement Company has opened a plant at Brookville, four miles east of St. John, and the operations will be started during the summer. The Maritime plant is located directly on the railroad, in a section which has been one of the leading lime quarrying and burning areas of the maritime provinces.

The machinery and other equipment for the Brookville cement factory have been ordered, and are to be installed when all the buildings are ready for occupancy. Some of the machinery is already on the ground, awaiting the installation. The close proximity to the railroad will facilitate shipments of the cement produced at this center, the intention being to ship all through the maritime provinces.

Lehigh Opens Airport Design Competition

The Lehigh Portland Cement Company has opened a $10,000 competition for designs of modern airports, open to engineers and architects.

It is intended through the competition to produce for aviation the most practical and suitable airport plans. Entries will be received until November 18th.

Beaver Reopens After Two-Month Cessation

The Beaver Portland Cement Company plant at Gold Hill, Oregon, resumed operations in the middle of March after a shutdown of about two months for repair work.

Plant to Salvagers

The Peerless-Egyptian Cement Company, Youngstown, Ohio, has disposed of its cement plant at Fenton, Michigan, to a salvage firm. Dismantling began late in February.

Looking west from the quarry of the Pacific Coast Cement Company at View Cove, Alaska. An outline of the quarry operation is contained in the accompanying article

Limestone for New Seattle Plant Brought from Alaska

Project Based on Exhaustive Surveys of Economic Conditions—Design of New Plant Based on Studies of Cement Technology, Modern Machinery and Methods—Raw Material Handling Influences Plant Layout—Rock Delivered from Alaska in Steel Cargo Ships—Hammerhead Crane Handles Rock at Plant Wharf—Clay Department—Plant Equipment—Cottrell Plant—Laboratory—The Alaska Quarry—The Development of the Project—Plant Designed to Make Normal and Special Cements

By S. E. HUTTON
Research Engineer, Pacific Coast Co., Seattle
Photographs by Boris Kviatkovski, Draftsman, Pacific Coast Engineering Co.

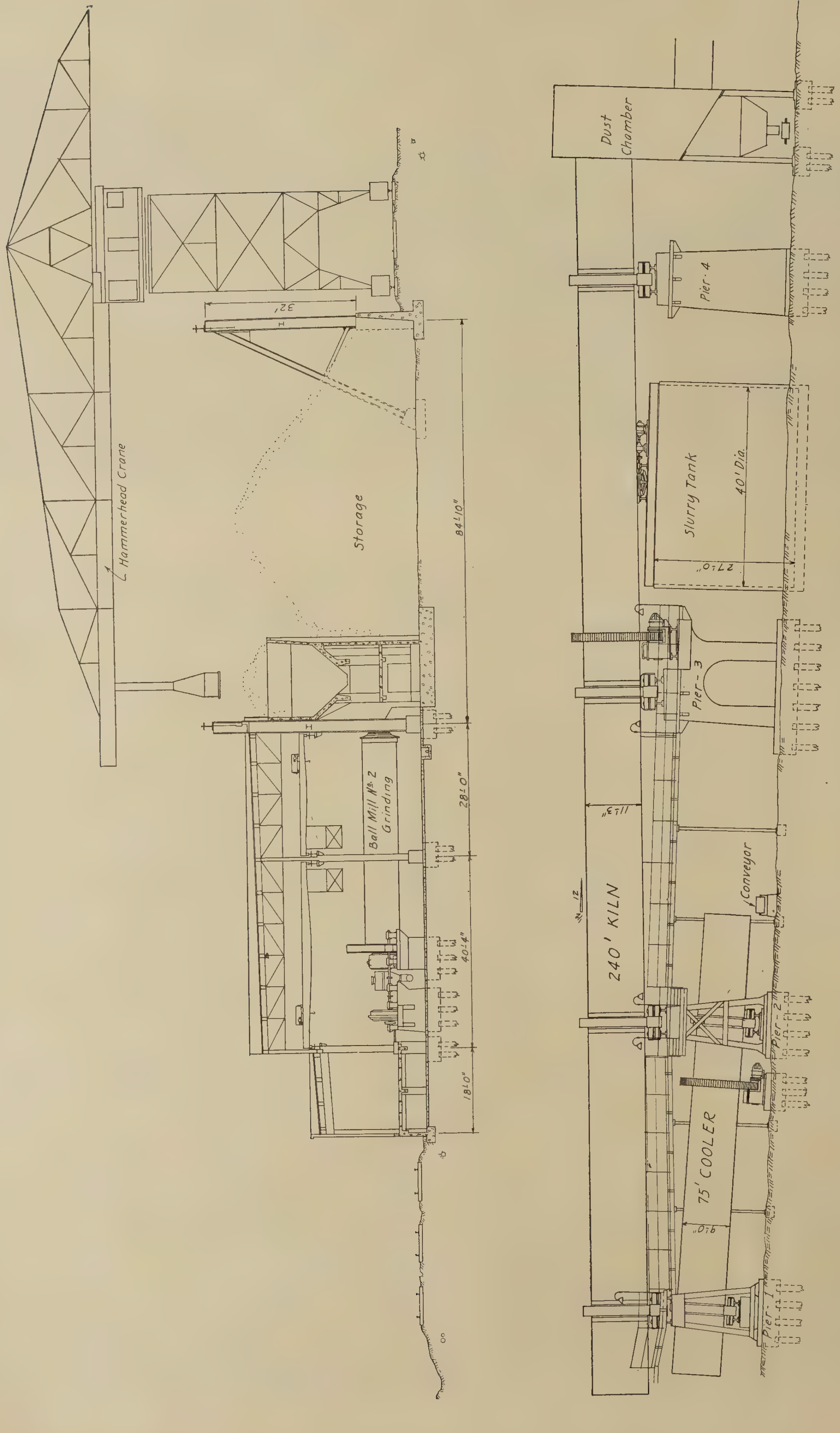
(Continued from the April Issue)

Two Chicago Pneumatic Company's air compressors, dentical except as to cylinders, are installed in one corner of the mill building. One delivers air at 35 lbs. pressure for slurry agitation, and the other delivers its output at 100 lbs. per sq. in. for use with the Fuller-Kinyon pump. Each is driven by a Fairbanks-Morse, 100-h.p., 2300-volt motor. Midwest air cleaners are used on the intakes of the compressors. Separators are inserted in the air lines, for he purpose of keeping oil out of the Dorr mixers, and moisture out of the Fuller-Kinyon pump.

The plan is to devote to slurry agitation both of the compressors now installed, and to install additional compressors for high pressure service later.

Finish Grinding

Of the three mills already installed, one is devoted exclusively to raw grinding, one to finish grinding, and one can be run in either service, that mill having both gypsum and slurry feeders, in addition to a poidometer. The output of the No. 2 mill can be delivered to either the slurry conveyor or the cement conveyor. All three of the present



Upper illustration, cross-section of grinding department and clinker storage, showing method of handling clinker from storage into mill feed bins. Below, longitudinal view of kiln and cooler installation mills are ultimately to be raw mills, and finishing mills will be added.

On the finishing mills, Stevenson gypsum feeders are driven from the poidometers. The mills are swept with air for the purpose of removing moisture, and to effect some cooling, the air passing to a New Haven flat bag dust arrester, placed outside of the mill building in such a position as to allow the addition of one more finishing mill before the dust arrester need be removed.

Coal Plant

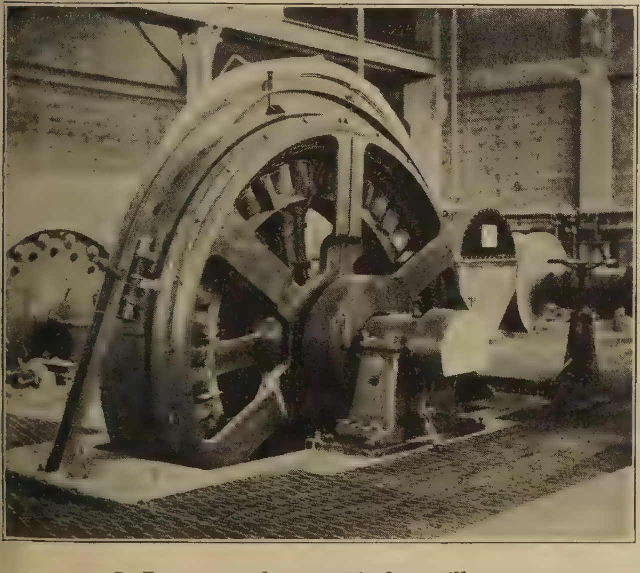
Buckwheat coal is purchased from the Pacific Coast Coal Company, and is delivered to the plant by the Pacific Coast Railroad Company. Both companies being subsidiaries of the Pacific Coast Company, and hence being closely related in management to the cement company, no coal storage is carried at the plant.

Major S. E. Hutton, designer of the Pacific Coast Cement Company plant and author of the accompanying description

Coal is taken from the track hopper by a Link-Belt drag-chain conveyor directly into a McGann (York) 80-in. by 40-ft. dryer, from which it is elevated to round, cone-bottomed, dried-coal tanks supported above the Raymond mills on the second floor of the coal mill building. The Raymond mills are air-swept, the air current carrying the coal into cyclone separators over the cylindrical powdered coal tanks above the firing floor. Two coal mills are installed, and space is provided for a third mill.

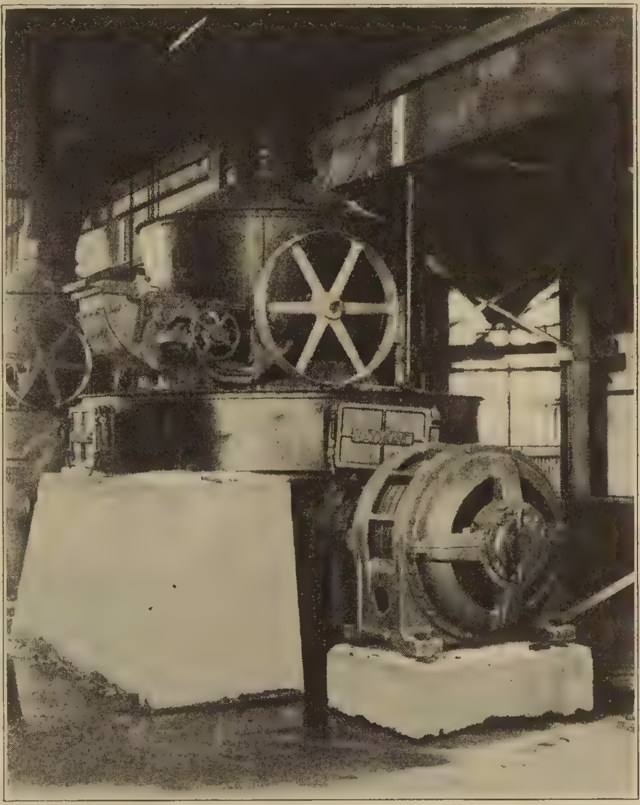
The Firing Floor

Over the firing floor, which is 48 ft. square, provisions have been made for three powdered coal tanks, two of which have been installed. Each tank has attached to its outlet a Bailey No. 120 coal feeder, which delivers its output into a 14-in. pipe carrying the blast from an American Blower Company No. 55E fan, driven at 900 r.p.m. by a 50-h.p. G. E. motor. The output of the fan can be adjusted by means of a butterfly valve in the intake pipe to cover the wide variations in the air requirements of the different coals available. The middle coal tank and feeder can serve either kiln.



G. E. supersynchronous 750 h.p. mill motor

At each side of the firing floor are grouped the controllers of the motors driving the cooler, kiln, fan, coal feeder, and slurry feeder on the same side. With the group on the corresponding side, there are included the controls of clinker elevator and conveyors. In the opposite group are the controls for the spare fan and coal feeder. A dead-front distributing cabinet is used in connection with each group of controllers, and each panel is equipped with an ammeter.



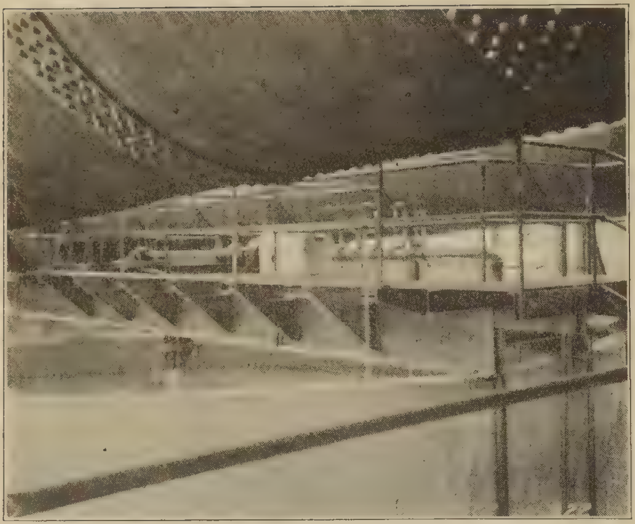
An illustration of the Raymond five-roller low side coal mills

The Kilns

The kilns, built by the Traylor Engineering and Manufacturing Company, are 11 ft. 3 in. in diameter inside, and 240 ft. long, and are carried at a slope of ½-in. per ft. on four sets of 42-in. single-roll supports. Each kiln is driven through a completely enclosed oil-flooded gear train, carried on Timken bearings, the total reduction ratio being 1800 to 1. The original installation included 75-h.p. 3-phase, 2300-volt motors, intended to run 900 to 1800 r.p.m., but a 50-h.p. motor, running 600 to 1200 r.p.m. has been substituted to improve the speed regulation.

The kiln piers were described in the December, 1928, issue of CONCRETE.

Each kiln is lined with 9-in. blocks, 120 ft. from the lower end and with 6-in. blocks throughout the remainder of the length. One lining consists of 70 ft. of Kruzite and 170 ft. of Empire blocks furnished by A. P. Green & Com-



The kiln tank between piers 3 and 4. The walkway and part of the mechanism of the Dorr mixer are seen also

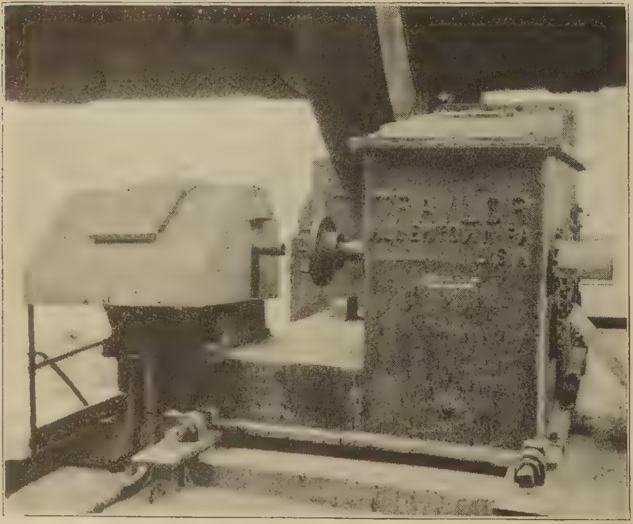
pany; the other lining is of Columbia blocks made by Gladding-McBean Company of Seattle.

Seal rings and firing hoods were furnished by Traylor.

Coolers

Coolers, 9 by 90 ft., are placed under the kilns at a slope of $\frac{1}{2}$-in. per ft., and are carried on single-roll supports, placed on the same foundations that carry the first two sets of kiln supports. The coolers are driven through enclosed gear sets similar to those used with the kilns.

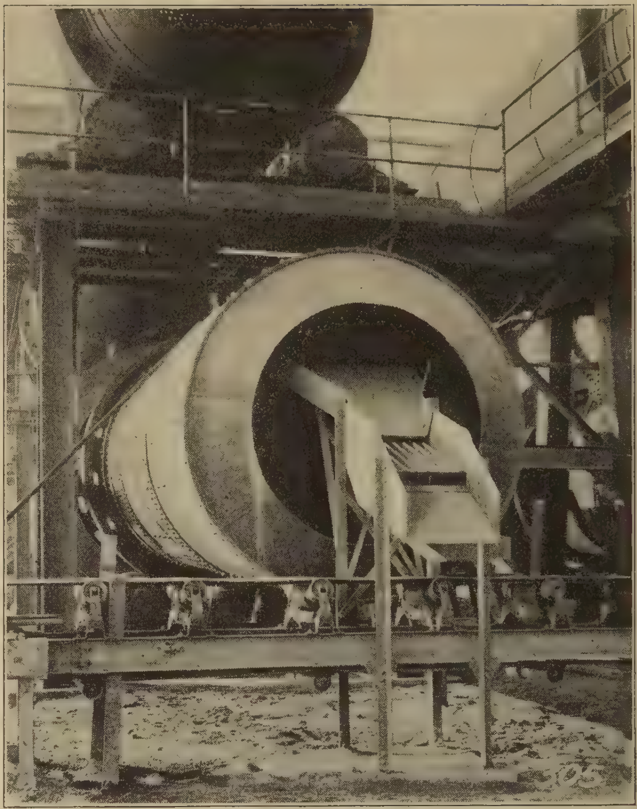
The upper ends of the coolers have white iron lining plates, some plain, some near the head and carrying "plows" to distribute the hot clinker, and many carrying lifters. The lower end is unlined, and is fitted with steel lifters. At the extreme end of the cooler, lifting buckets are used to dump the clinker into the chutes that deliver the clinker to a transverse belt conveyor, at a temperature of 110 to 120 degrees Fahrenheit.



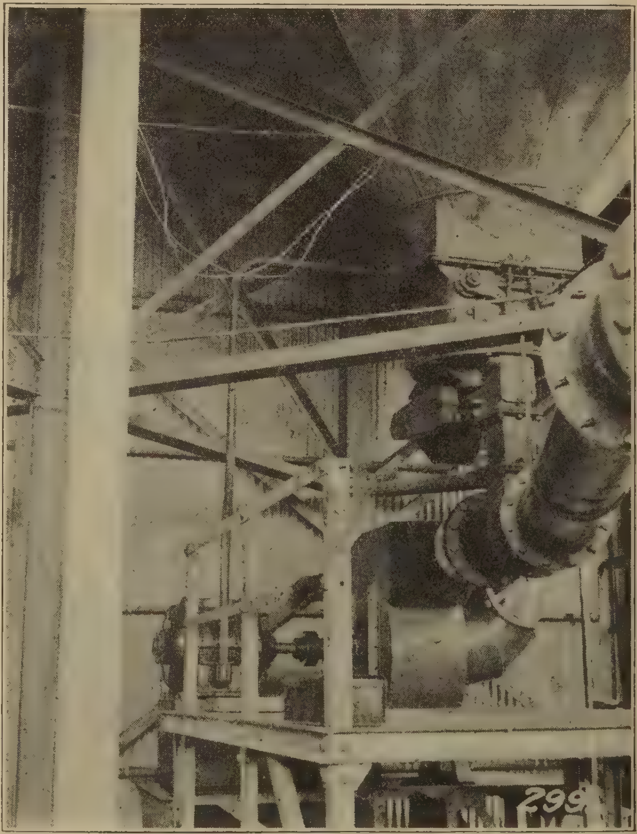
Kiln No. 2 is driven by this enclosed train of gears and motor

Clinker Storage and Handling

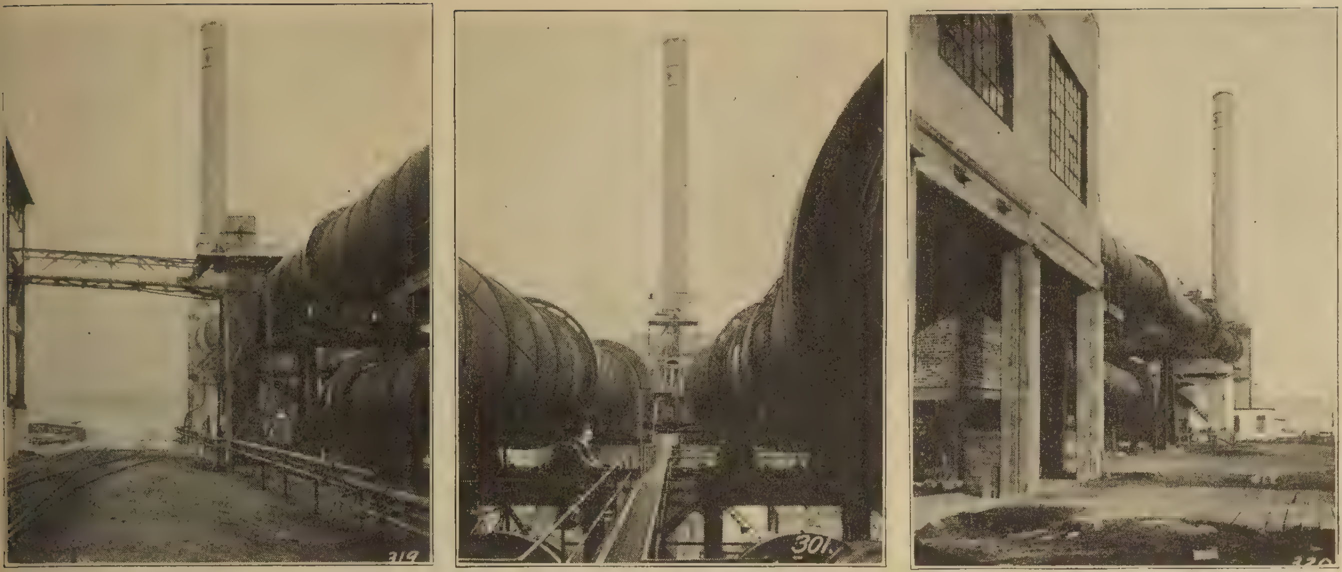
The conveyor which receives the clinker from the coolers consists of a traction belt, over which runs a special heat-resisting belt made by the Boston Woven Hose and Rubber Company. This conveyor discharges into the boot of a bucket elevator which delivers the clinker to a second single belt conveyor, carried on light steel trusses, spanning the coal tracks and terminating in the clinker stor-



The discharge end of the cooler, showing the chute and belt conveyor



Equipment at Kiln No. 1 includes the Bailey feeder, powdered coal tank, American blast fan and a G. E. motor



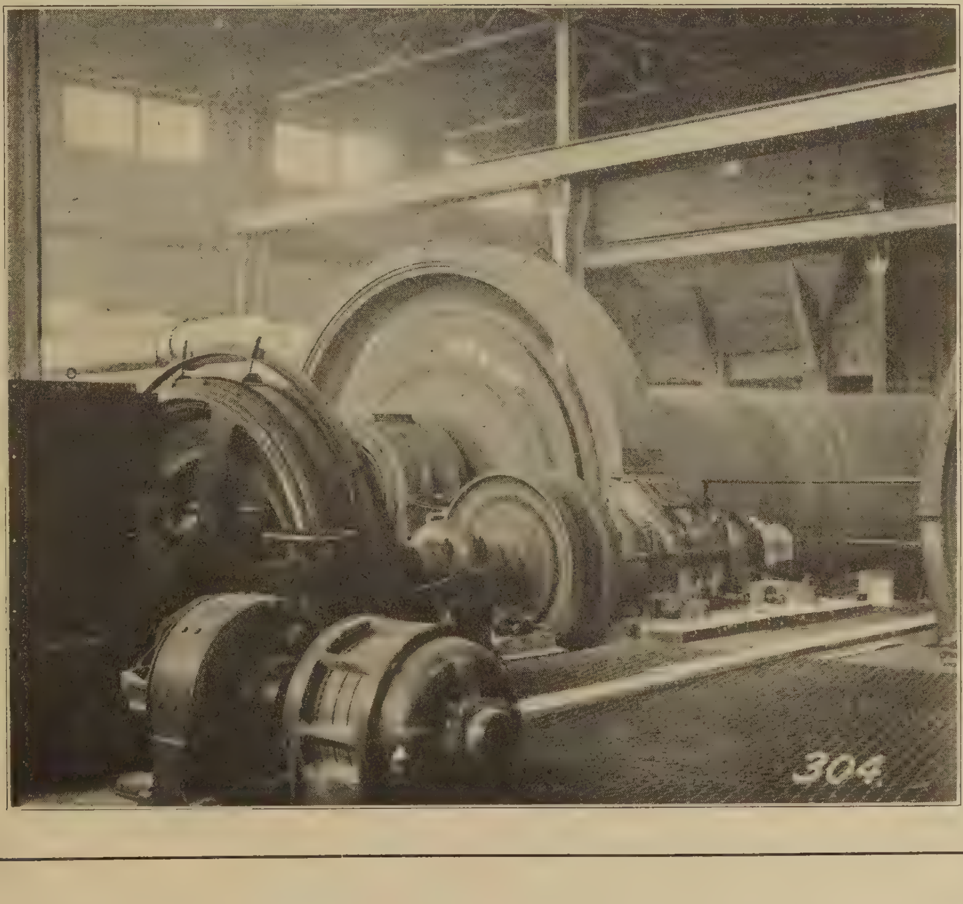
The kilns of the Pacific Coast Cement Company as seen from the west. The first view, from left to right, shows the north side of Kiln No. 1, and includes the coal tracks, clinker elevator and conveyor, water, air and slurry pipes. Looking toward the chimney, in the second illustration, are seen the walkway between kilns and railed platforms at piers. The south side of Kiln No. 2 appears at the right, with the kiln tank and stairway leading to its top visible through the pier

age building. The conveying equipment was furnished and erected by the Link-Belt-Meese and Gottfried Company of Seattle. Ball bearing conveyor rolls are used.

The clinker storage building is about 85 ft. wide, and is 240 ft. long. Along the south side and east end are 12-ft. cantilever retaining walls. Steel columns, spaced on 24-ft. centers, are carried on pilasters in the south wall, and on individual footings on the north side of the building where future additions of mills, feed bins, and other equipment will be made.

The west end of the clinker storage area is bounded by a reinforced concrete tunnel, through which pipes, conduits, and a man-way pass from the mill building to the kiln department.

A 9-ton Milwaukee crane traverses the clinker storage building and four sections of unroofed craneway to the westward, where crushed rock is stored by the hammerhead crane. Clinker and crushed rock are handled, and



Mil No. 2 in operation. The motor generator set for excitation of supersynchronous motors is seen in the foreground are fed to the mill bins, by means of a Williams Favorite 3-yd. bucket.

Flues and Dust Chambers

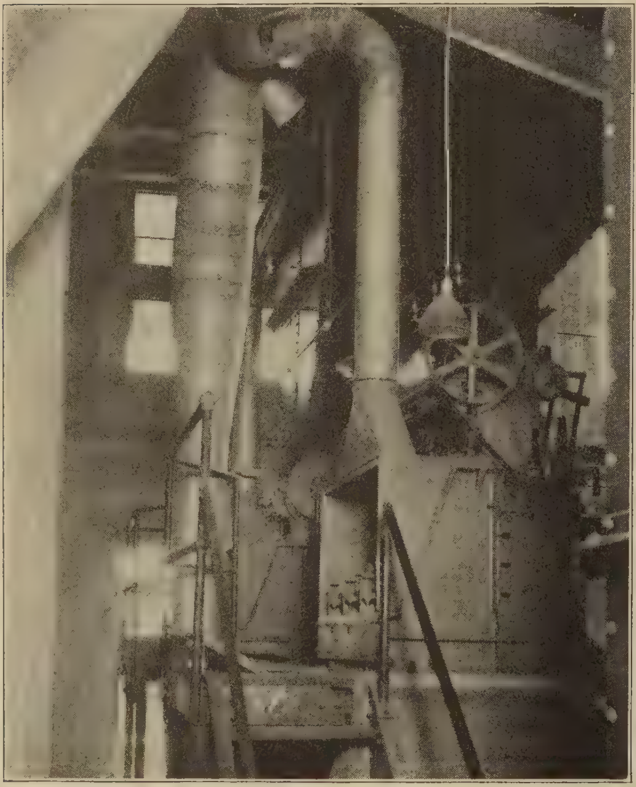
Kiln gases are discharged into concrete dust chambers, lined with firebrick, and provided with inspection doors at the top and with steel hoppers at the bottom. Tubular flues, fitted with dampers, and small in diameter in order to keep up gas velocities and to minimize settlement of dust, connect the two dust chambers with a single compartment in the Cottrell precipitator.

On the top of each dust chamber is a Traylor ferris-wheel slurry feeder discharging into an air-jacketed pipe which passes through the top of the dust chamber and enters the end of the kiln. Between the two dust chambers is an elevator, which receives dust from screw conveyors under the dust chambers and in the Cottrell plant, and can discharge it into the kilns or into a pipe for disposal elsewhere.

Cottrell Plant

The plant being located in a city, the utmost effort has been made to prevent the development of any dust nuisance. As a first step, dust-tight conveyors and elevators have been used throughout the plant to prevent the escape of dust wherever that can be accomplished.

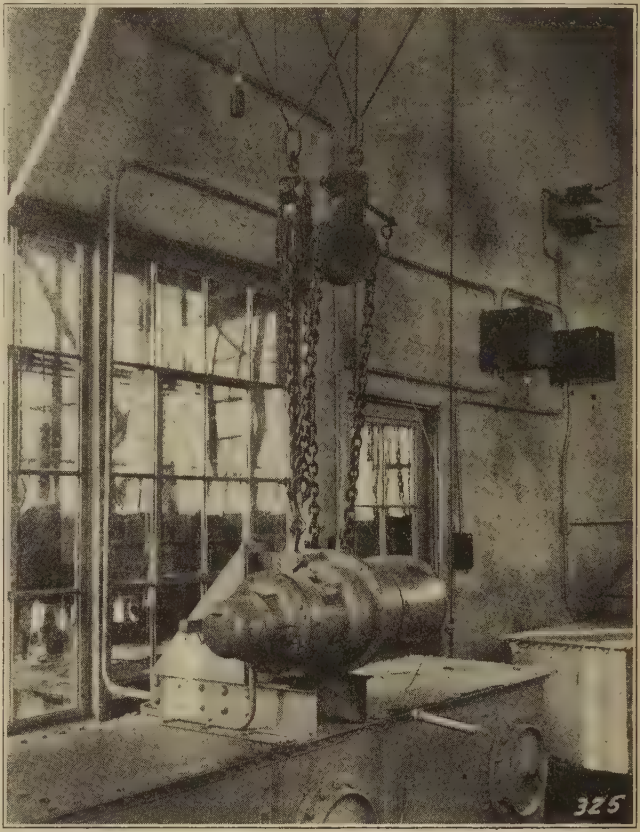
Dust arresters have been installed in the mill and packing departments, and flue dusts are collected in a rod-curtain electrode type of electrical precipitator, designed and built by the patentees, the Western Precipitation Company of Los Angeles.



Showing the dust collector pipe and the walkway behind the baggers

The precipitation plant consists of a structure of steel beams and columns, enclosed in concrete and tile walls and floors forming precipitation compartments, with collecting hoppers and conveyors for dust below them, and sub-station and operating floor above them; all so combined and housed as to have the appearance of a rectangular building about 32 ft. wide, 60 ft. high, and 60 ft. long.

The precipitator consists of two units of three sections each, with inlet and outlet compartments at the ends, from which either section can be shut off by means of dampers. In each section, discharge electrodes of twisted square rods, and collecting electrodes of 1/8-in. pipe are suspended, the former on high tension insulators.



The insulator housing and electric hoist for operating dampers in the Cottrell plant

Energy is supplied to the plant at 440 volts through a safety switch panel, and is distributed through five dead-front switchboard panels to five grille-enclosed compartments, each containing a step-up transformer on the top of which is mounted a synchronous motor, driving a disc type rectifier. Special devices connected in the transformer leads are so effective in preventing radio disturbances that reception at the plant is unaffected.

On the operative floor are air hammers used in rapping dust from the collecting electrodes, electric hoists for operating the dampers, and switch handles for making and breaking connections between the overhead high tension wiring and the electrodes.

Chimney

From the Cottrell plant, gases pass to the chimney through a rectangular, upwardly inclined breeching, provided with a bellows section to take care of expansion and contraction.

This chimney is of reinforced concrete, 10 ft. in diameter inside of the lining and 200 ft. high. It rests on an octagonal slab of reinforced concrete, 5 ft. thick under the chimney, and 35 ft. across the flats, carried on 97 piles 36 ft. long. It was built by the Rust Engineering Company of Pittsburgh.

(To Be Concluded)

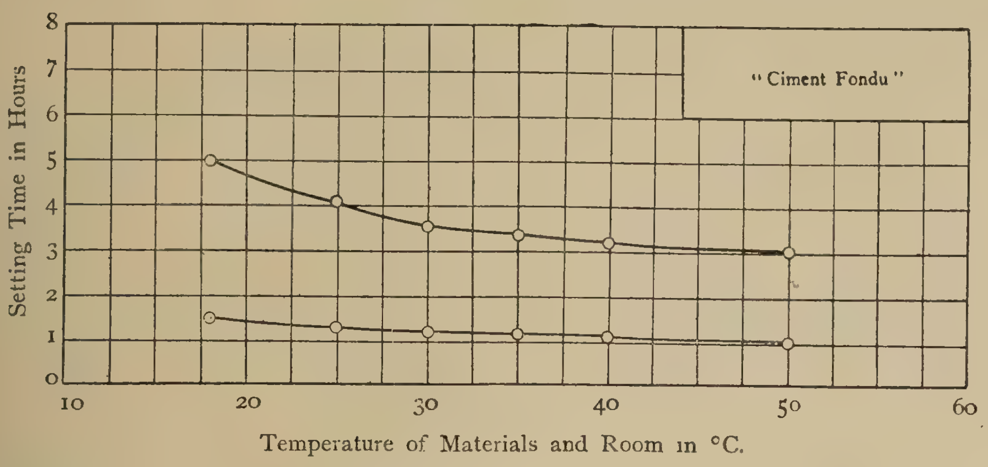


Figure 6

(Continued from Page 111)

the temperature of the material as the abscissa. The shortening of the setting-time with the rise of temperature is clearly revealed. A comparison of the effect of temperature on the setting time both of this cement and of the portland cement will be made later on.

The "Ciment Fondu" specimen belongs to the aluminous cement. Its chemical analysis[10] is as follows:

Sample	SiO_2	Fe_2O_3	Al_2O_3	CaO	Magnesia	Sulphur trioxide	Ignition loss
"Ciment Fondu"	8.42	7.58	41.68	43.02	0.60	0.28	—

The results of experiments at 18 deg., 25 deg., 30 deg., 35 deg., 40 deg., and 50 deg. are given in Fig. 5. As is evident from the figure, the process of the setting is greatly accelerated with the rise of temperature. The noteworthy feature of the figure is that at first a new break appears in the conductivity-time curve. It is to be understood that this break shows the hydration of the calcium aluminate, as the calcium aluminate is very reactive to water and sets very rapidly.[11] It is therefore necessary to distinguish the setting of calcium aluminate, which corresponds to the initial set, from that of the calcium alumino-silicate or calcium silicate, which corresponds to the final set. The setting time determined from the conductivity-time curve is shown in Table 2 and given in Fig. 6. As seen from the

TABLE 2.

Temperature (deg. C.)	18	25	30	35	40	50
Setting Time (Initial) in Minutes	90	80	75	70	60	55
Setting Time (Final) in Minutes	5	4 1/6	3½	3 1/3	3 1/6	3

figure, the setting time is shortened with the rise of temperature, and the effect of temperature on the initial set is not greater than that on the final set. A comparison of the effect of temperature on the setting time both of the aluminous cement and of the portland cement will be made later on.

The "Atlas Lumnite" specimen belongs to the aluminous cement. The chemical analysis[12] of the specimen is shown in the following table.

Sample	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	SO_3	Ignition loss
"Atlas Lumnite"	4.92	15.16	37.76	38.59	0.96	1.00	2.10

The results of experiments at 18 deg., 25 deg., 30 deg., 35 deg., 40 deg., and 50 deg. are embodied in Fig. 7. As is evident from the figure, the process of the setting is greatly accelerated with the rise of temperature. The noteworthy feature of the figure is also that at first a break appears in the conductivity-time curve, just as in the case of the "Ciment Fondu." Therefore, it is also necessary to distinguish the setting of the calcium aluminate from that of the calcium alumino-silicate or the calcium silicate. The setting time determined from the conductivity-time curve is given in Fig. 8. As is evident from the figure, the setting time is shortened with the rise of temperature and the effect of temperature on the initial set is not

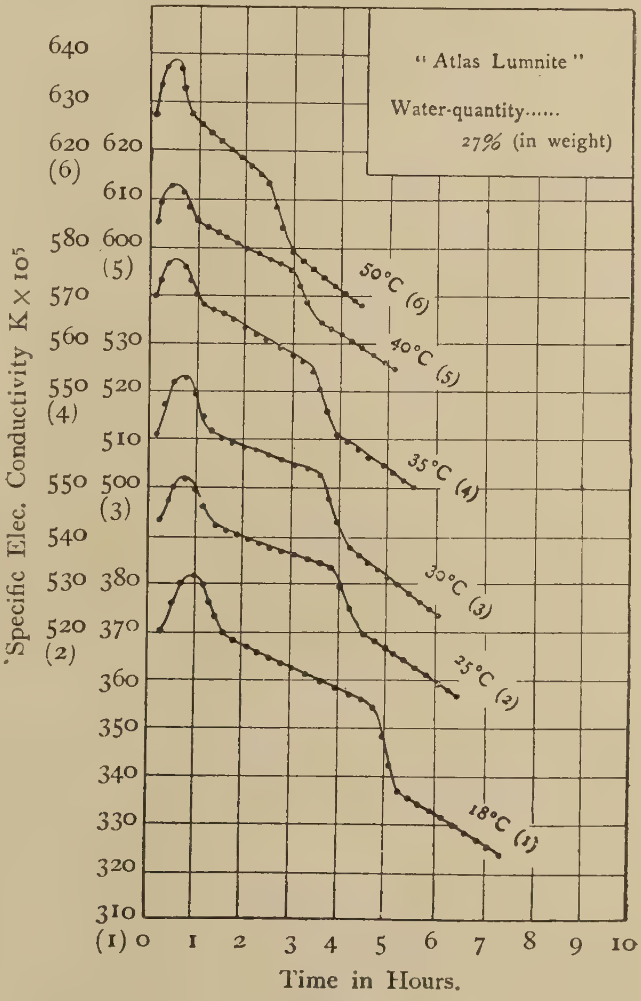


Figure 7

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[10] T. Yoshioka and K. Kumagae, loc. cit.

[11] Wm. Lerch and R. H. Bogue studied the hydrolysis of compounds which may occur in portland cement. "Journ. Phys. Chem." 31 (1927), 1627. Also, the writer directly confirmed that this first break, corresponding to the hydration of calcium aluminate, appears in the conductivity-time curve for pure calcium aluminate. The study of the pure compounds in the $CaO\text{-}Al_2O_3\text{-}SiO_2$ system will be reported later.

[12] T. Yoshioka and K. Kumagae, loc. cit.

greater than that on the final set. A comparison of the effect of temperature on the setting time both of the aluminous cement with that on the setting time of the portland cement will be made later on.

Discussion of the Results

(*a*) *Comparison of the conductivity-time curves*

Let us, for convenience of explanation, arrange the conductivity-time curve at 25 deg., in the order "Dyckerhoff Doppel," "Rapid Hardening Ferrocrete," "Ciment Fondu" and "Atlas Lumnite," as in Fig. 9. As evident from the figure, there exist in the case of aluminous cement, such as "Ciment Fondu" and "Atlas Lumnite," two breaks,—the first corresponding to the hydration of calcium aluminate and the second to that of calcium alumino-silicate or calcium silicate—but that in the case of super cement of the portland type, such as "Dyckerhoff Doppel" and "Rapid Hardening Ferrocrete," there is only one break, which corresponds to the hydration of calcium alumino-silicate or calcium silicate. From these experimental facts, the writer concludes that in the portland cement clinker calcium aluminate does not exist.[13]

Also, as is evident from Fig. 9, the specific electrical resistance in the aluminous cement is much greater than that of the super cement of the portland type and the rate of its increase with time in the former is very much greater than that in the latter. These facts may be explained in the following manner: The aluminous cement contains calcium aluminate which is very reactive to water and sets very rapidly, so that the specific electrical resistance increases remarkably. It is well known that the strength at a short period (one day or the two days after gauging) of the aluminous cement is remarkably greater than that of the super cement of the portland type. This is also to be explained in a similar manner.

Next, let us consider on the basis of the experimental results mentioned above the constitution of portland cement, which continues to be a vexed question among American and European scientists.

From their systematic study of the phase equilibria of the CaO—Al_2O_3—SiO_2 system, American scientists in the Carnegie Institution, such as Day, Allen, Shepherd, Wright and Rankin[14] concluded that portland cement clinker contains free $3CaO.SiO_2$, $2CaO.SiO_2$ and $3CaO.Al_2O_3$. But the writer cannot agree with this conclusion; for the break corresponding to the calcium aluminate does not appear in the conductivity-time curve of portland cement. If Rankin's deductions concerning the constitution of portland cement, viz., that its composition is approximately $3CaO.SiO_2$, 45 per cent, $2CaO.SiO_2$, 35 per cent, and $3CaO.Al_2O_3$, 20 per cent, are true, the break corresponding to $3CaO.Al_2O_3$ must appear in the conductivity-time curve of portland cement, but our present result is decidedly unfavorable to his conclusion.

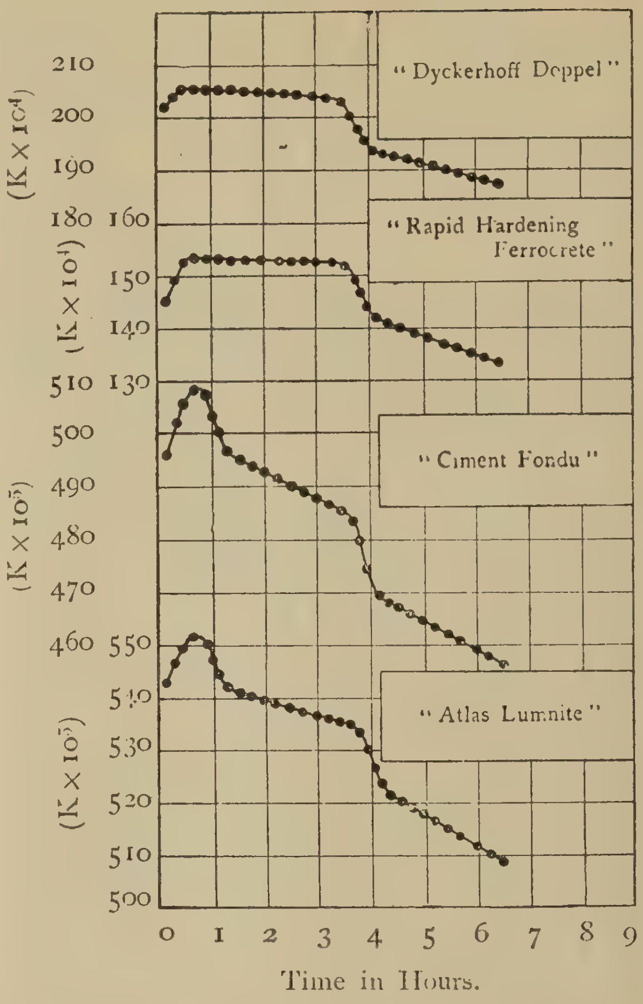

Figure 9

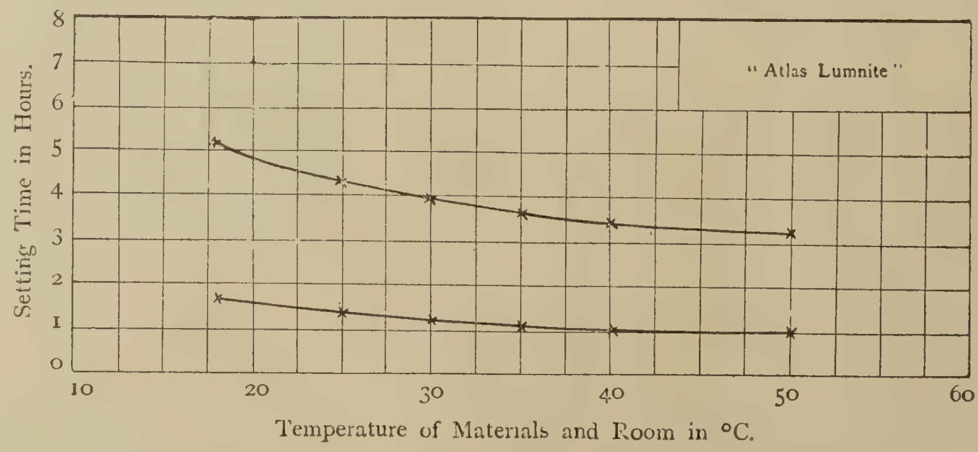

Figure 8

From some of his experimental results, Janecke[15] claimed the existence of a ternary compound $8CaO.2SiO_2.Al_2O_3$ and continues to insist this compound to be the principal constituent of portland cement clinker "alite," while others, especially many of American investigators,

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[13] H. Kuhl considers that there are no regular crystals of lime-rich aluminates in thin sections of portland cement clinker, and that therefore the clinker contains no free aluminates. "Tonind, Zt.," 38, (1914), 537.

[14] G. A. Rankin, "Zet. anorg. Chem.," 92, (1915), 213.

[15] E. Janecke, "Zeit. anorg. Chem.," 73, (1912), 200; 75, (1912), 63; 93, (1915), 271. "Zement," 14, (1925), 272; 17, (1928), 48.

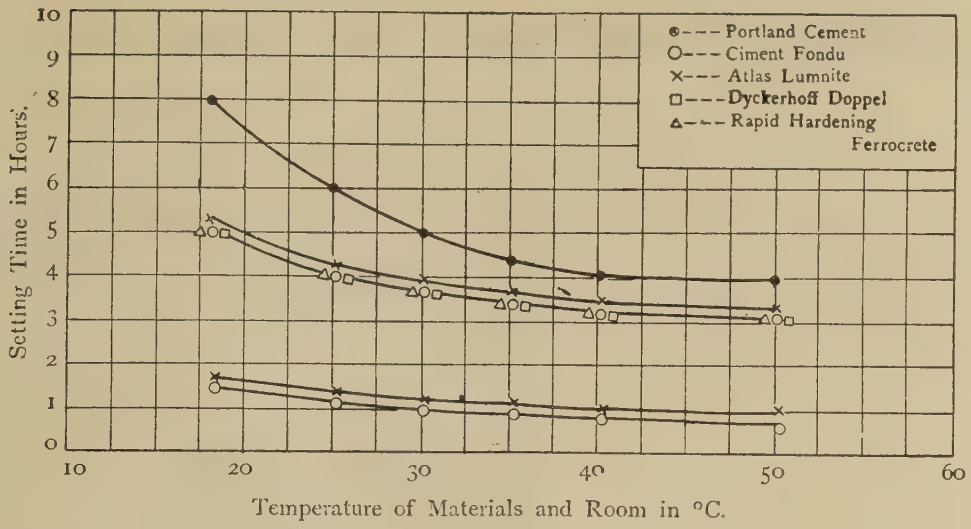

Figure 10

consider it to be a mixture of $3CaO.SiO_2$, $2CaO.SiO_2$ and $3CaO.Al_2O_3$. Janecke expresses the average composition of portland cement clinker as follows: 8 $CaO.2SiO_2.Al_2O_3$, 47.15 per cent; $2CaO.SiO_2$, 39.7 per cent; $3CaOFe_2O_3$, 5.75 per cent; and CaO, 7.4 per cent. Thus, according to Janecke's view, no calcium aluminate exists in the clinker of portland cement, and hence, his view is in conformity with our experimental results regarding the conductivity-time curve of super cements of the portland type, or portland cement. Quite recently, H. Kuhl considered that "alite," the principal constituent of portland cement, does not consist of $8CaO.2SiO_2.Al_2O_3$ only, but of the mixed crystals of $8CaO.2SiO_2.Al_2O_3$ and $3CaO.SiO_2$.[16]

(*b*) *Comparison of the effect of temperature on the setting time of the cements above*

The graphs showing the effect of temperature on the setting time determined from the conductivity-time curves of portland cement[17] and of the rapid-hardening cements mentioned above are embodied in Fig. 10. As is evident from the figure, the more rapid the setting of the cements, the less the effect of temperature on their setting time. Also, the setting time of aluminous cements is nearly equal to that of the super cements of the portland type, which result is in conformity with that obtained by means of Vicat's needle.

Summary

The results of the present investigation may be summarized in the following words:—

(1) In the conductivity-time curve of aluminous cements, two breaks,—the first corresponding to the hydration of the calcium aluminate and the second to that of the calcium alumino-silicate or calcium silicate,—were observed, but in the case of the super cements of the portland type, only one break, which corresponds to the hydration of the calcium alumino-silicate or calcium silicate, was observed. From these experimental results, the writer has come to the conclusion that calcium aluminate does not probably exist in the portland cement clinker.

(2) The specific electrical resistance during the setting and hardening of the aluminous cement is much greater than that in the case of the super cement of the portland type, the rate of its increase with time in the case of the former being very much greater.

(3) The setting time of the cements mentioned above was determined from their conductivity-time curve. The effect of temperature on the setting time has also been studied.

In conclusion, the writer expresses his cordial thanks to Professor K. Honda and to Assistant Professor S. Uchida, under whose kind guidance the present experiment has been carried out, and also to Dr. N. Mononobe, director of the Bureau of Public Works, Home Department, who kindly furnished him with the rapid-hardening cements for this experiment.

Pennsylvania Dixie Takes Over Pyramid Properties

The Pennsylvania Dixie Cement Corporation on April 10th acquired the business and property formerly owned by the Pyramid Portland Cement Company of Delaware. The Pyramid trade name has been replaced by the brand name "Penn-Dixie."

The Pyramid plant is located at Valley Junction, Iowa, and offices are at Des Moines, Iowa.

The organization personnel includes Conrad C. Miller, manager, Hardy Magrath, sales manager, R. J. Hild, assistant sales manager, R. A. Bechtold, superintendent, Guy D. Pitts, assistant treasurer.

Pennsylvania Dixie Corporation's total capacity is now 12,200,000 barrels per year.

U. S. Capital Backs Proposed Vancouver Plant

Seattle cement manufacturing interests are reported to be backing the erection of a cement plant to cost $1,500,000 at Vancouver, Canada.

The proposed project would have an annual capacity of 300,000 barrels and raw material would come from property owned at Popkum, 17 miles east of New Westminister on the Canadian National Railway. The property there covers approximately 40 acres and a spur line has already been built to it.

Michigan Urges Tariff

The Michigan state legislature on March 29th passed a resolution urging Congress to provide a high protective tariff on cement.

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[16] H. Kuhl, "Zement," 16, (1927), 118; 17, (1928), 188.

[17] Shimizu, loc. cit.

MEN and MILLS

Notes from the Field

Alfred F. Smith New Chairman of Monolith Executive Committee

Alfred F. Smith has been elected chairman of the executive committee of the Monolith Portland Cement Company and will be chief executive for that firm on the Pacific Coast.

While Mr. Smith has become one of the largest stockholders of the Monolith Company, no change of ownership or control has resulted following the election, according to Mr. Burnett.

Newaygo Band Gives Annual Concert

The sixth annual concert of the Newaygo Portland Cement Company band was given at a Newaygo, Michigan, theater on the evening of April 1st.

C. A. Skelcher has been in charge for several months.

Ege Tells Advertising Council of Association's Work

C. R. Ege, manager of advertising and publications for the Portland Cement Association, on April 11th addressed the Advertising Council of Chicago on the subject of the association's success in creating new markets by stimulating public demand.

As proof of the efficiency of the promotional campaign he pointed to the fact that 25 per cent of the demand for cement is for the building of highways, a use created by the bureau's efforts.

Presides at Safety Gathering

The regional safety meeting of the Portland Cement Association held at La Salle, Illinois, on February 26th, was ably presided over by John Young, shown above. He is superintendent of the Lehigh Portland Cement Company plant at Oglesby, Ill.

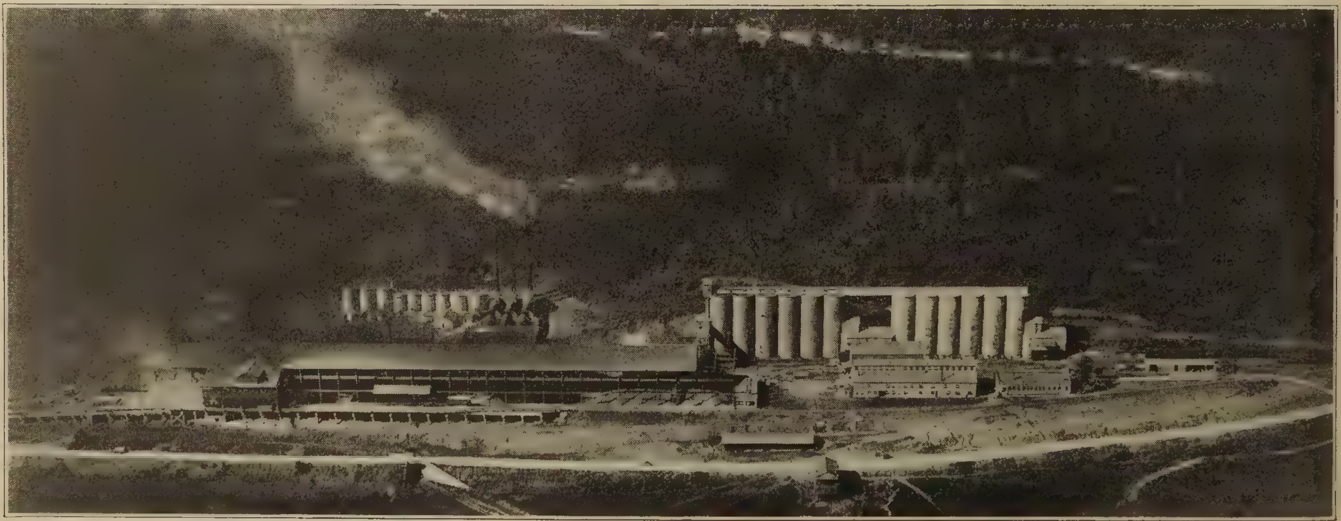
Head of National Lime and Cement Corporation of Broad Business Experience

A varied career has been the choice of Francis L. Hoff, president of the National Lime, Cement and Byproducts Corporation, which is now building a $300,000 plant for the production of cement and other non-metallic products at Sheffield, Ala.

He has been in business at Buffalo, New York, for the past forty years. Mr. Hoff's early training was as a clerk in a country store and later in the editorial department of a legal publishing company. At one time he represented a savings bank in loaning money upon improved real estate. Subsequently he had charge of office business for the Martin Anti-Fire Heating Company and was connected also with the Lehigh Valley Coal Company at Buffalo.

Mr. Hoff has two sons, both of whom were in France during the World War, Schuyler L. being a lieutenant in the aviation service, and Nelson Pruyn in the motor dispatch rider service. The latter is now editor of the Blue Book of Alabama and will, when this is completed, be the vice-president and sales manager of the National Lime Cement and Byproducts Corporation. The former is now secretary and assistant treasurer of the corporation.

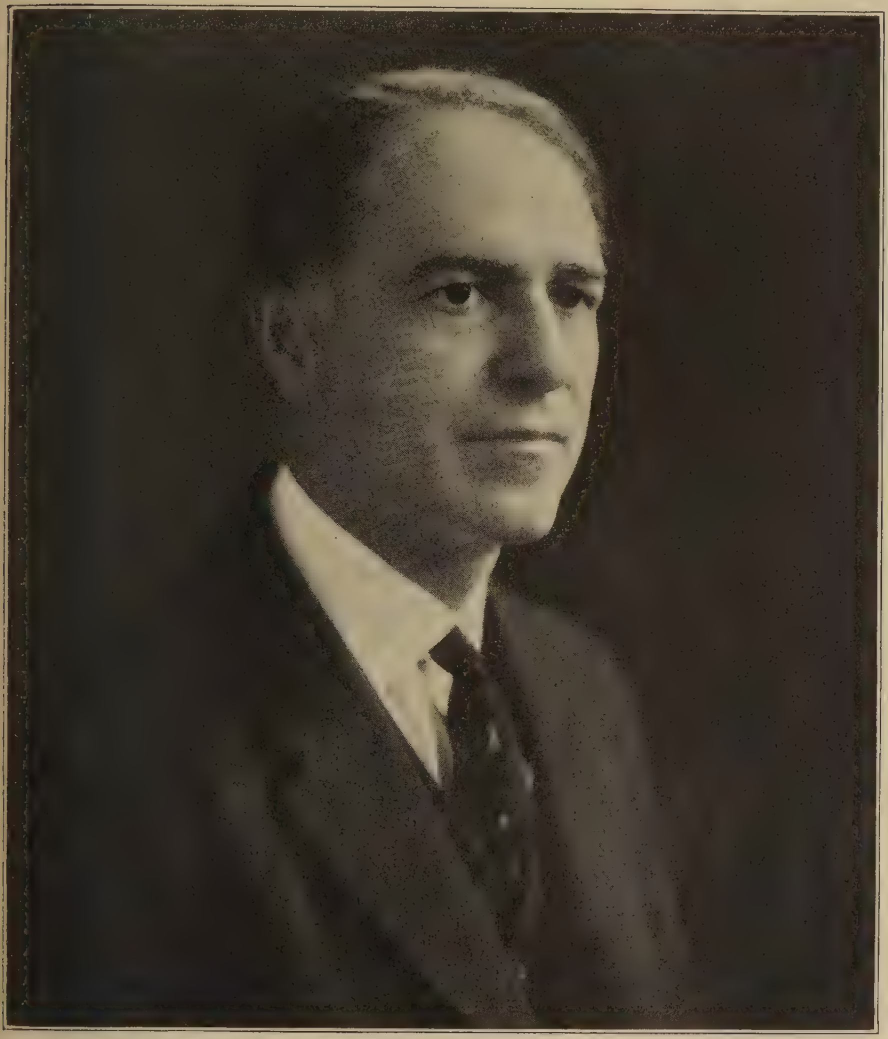
View of the Signal Mountain Plant



A panoramic view of the plant of the Signal Mountain Portland Cement Co. near Chattanooga, Tenn. The white stretch in the foreground is the Dixie highway

Colonel James Fuller Dies at San Francisco

Industrial Leader Becomes Ill on Board Ship Returning from Pleasure Trip at Hawaii; Death Occurs April 4th



The sudden death of Colonel James W. Fuller of Catasauqua, Pa., occurred at San Francisco, California, on April 4th.

Colonel Fuller, with his family, had been returning from Honolulu when he was stricken on board ship. Immediately upon arrival of the steamship in San Francisco harbor on March 20th, Colonel Fuller was taken to St. Luke's hospital, where he remained until his death. Burial took place at Catasauqua on April 10th.

Colonel Fuller had numerous business and personal interests. When the Allentown Portland Cement Company at Catasauqua was organized he was vice-president and managing director and later became president. In 1927 he organized the Valley Forge Cement Company at West Conshohocken, Pa., and served as its president. He held a similar position with the Fuller Company, Catasauqua, Pa., the manufacturers of the Fuller-Kinyon pump. He is credited with the invention and manufacture of the Fuller mill, for the grinding of clinker, rock and coal, which is still used extensively in cement plant coal grinding. Also, the introduction of extensive use of chilled iron into the cement industry.

Colonel Fuller organized and was for many years head of the Fuller Engineering Company, Allentown, who designed and constructed a number of cement plants in the United States and abroad, and who built the plants of the Allentown Portland Cement Company. Tidewater Portland Cement Company (now a Lehigh company plant), International Portland Cement Company of Spokane, Seaboard Portland Cement Company (now Acme Portland Cement Company), Catskill, N. Y., Standard Portland Cement Company, Painesville, Ohio; the West Penn Cement Company, at Butler, Pa., and the Dominion Portland Cement Company, New Zealand. The Fuller Engineering Company also participated in a consulting capacity in the modernization and rebuilding of a number of plants, as well as operating the Eastern Testing Laboratory at Allentown in cooperation with Richard K. Meade.

The Fuller Engineering Company is now part of the Fuller Lehigh Company.

Colonel Fuller was born April 2, 1873, at Catasauqua, the son of James W. Fuller, a successful man of many interests. His father was president of the McKee Fuller Company, which subsequently became the Lehigh Car, Wheel and Axle Company and later, the Fuller Lehigh Company, of which he was the founder and executive head up to the time of his death, when he was succeeded by his son.

Following completion of his formal schooling, Colonel Fuller apprenticed himself to the Machinists' and Moulders' trades in the McKee Fuller establishment. Mastering the details of his vocation, he continued his career through the different departments. As president of the Fuller Lehigh Company he remained until January, 1926, when the firm was sold to the Babcock and Wilcox interests, becoming chairman of the board of the new owners. On April 1st of that year Colonel Fuller retired from the Babcock-Wilcox organization and formed the Fuller Company. Prior to their sale, he was also a director of the Railway Steel Spring Company and a member of the executive committee of the Empire Steel and Iron Company. His professional connections included the American Society of Mechanical Engineers, the American Institute of Mining and Metallurgical Engineers, the International Railway Fuel Association, the American Iron and Steel Institute, and the Pennsylvania State Chamber of Commerce.

Colonel Fuller was a direct descendant of Edward Fuller, one of the signers of a compact drawn up by the Pilgrim fathers aboard the Mayflower prior to their landing at Plymouth in November, 1620. These ancestors emigrated to Pennsylvania after a short stay in the New England territory, and located in eastern Pennsylvania, some in the coal regions, and others in and around Lehigh County.

Colonel Fuller had served on the military staff of a former governor of Pennsylvania, thus earning his title.

Safety Subject of Radio Talks by National Leaders

Charles M. Schwab headed the list of a group of national leaders carrying the message of universal safety by weekly, nationally broadcast radio addresses when he delivered a talk on the evening of April 20th.

Alarmed by the accident fatality toll which claims nearly 100,000 lives each year in the United States, the National Broadcasting Company, in co-operation with the National Safety Council is presenting this "Universal Safety Series" in an effort to awaken the American people from an attitude of seeming indifference toward a national problem of vital importance.

In addition to Mr. Schwab, who discussed "Safety as a Factor in Industry" the following speakers are announced:

Hon. Robert P. Lamont, secretary of commerce: "Safety as a National Problem"; Hon. James J. Davis, secretary of labor: "Safety and the Worker"; Madam Schuman-Heink, "Safety in the Home"; Dr. Miller McClintock, director, Albert Russell Erskine Bureau of Street Traffic Research, Harvard University: "Making Our Highways Safe"; Grover Whalen, commissioner of police, New York: "Enforcement as an Aid to Safety"; Joseph E. Sheedy, executive vice-president, United States Lines: "Safety on the High Seas," and President P. R. Crowley, New York Central Lines, on "The Railroads and Safety."

President Henry A. Reninger of the National Safety Council outlined the series and introduced Mr. Schwab. The other twelve talks to be given on successive Saturday evenings, will go on the air at 7:15 and will be of fifteen minutes' duration. All talks will be given on eastern standard time schedules.

All speakers, with the exception of the two cabinet members, will talk from the New York NBC studios. Messrs. Lamont and Davis will speak from Washington.

Shippers Board Forecasts Increased Cement Shipments

Some six hundred representatives of shippers and receivers of freight, as well as the railroads serving the middle Atlantic states territory on April 4th heard reports that the volume of business to be moved during the months of April, May and June would average considerably more than the corresponding quarter of last year. Taking all lines as a whole the increase over the second quarter of 1928 will average 2.8 per cent, it is predicted.

Regarding cement, it was estimated shipments for the second quarter of 1929 will slightly exceed 1928, when 74,685 cars were shipped, 3 to 5 per cent.

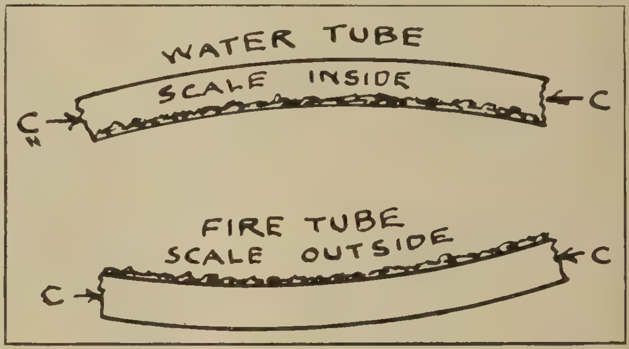
The occasion was the twentieth regular meeting of the Atlantic States Shippers Advisory Board, which organization has effectively aided the carriers in bringing their service up to the highest point of efficiency in their history. The meeting was held in the Benjamin Franklin Hotel at Philadelphia and H. E. Stringer, of Washington, D. C., newly elected general chairman of the board, presided.

In addition to the various commodity committee reports, which touched on all the basic industries, E. J. Cleave, of New York, district manager of the car service division of the American Railway Association, reported on conditions throughout the territory covered by the Atlantic States Advisory Board, while W. C. Kendall, of the Washington headquarters of the American Railway Association, spoke on general transportation conditions throughout the country. J. W. Roberts, assistant vice-president of the Pennsylvania Railroad, with headquarters in New York, spoke for the railroad contact committee, which represents all the carriers in the east. C. B. Sudborough, vice-president in charge of traffic, Pennsylvania Railroad, addressed the board members at luncheon.

Explanation of Buckling of Boiler Tubes

By W. F. SCHAPHORST

It has been observed that when tubes in horizontal water tube boilers buckle, they buckle upward. And on the other hand, in the fire tube type of boiler the tubes buckle downward. The accompanying sketch shows why the tubes buckle as they do, in opposite directions.



When the steel of which boiler tubes are made becomes heated, it naturally weakens, and therefore the hottest side is the weakest side. In the water-tube boiler the weakest side is on the bottom because the bottom is hottest. The forces "C" acting on the tube when in operation are compressive forces and are equal and opposite in direction, acting from the ends parallel with the tube. The hottest side compresses more readily than the cooler side, and therefore in the case of the water-tube boiler the buckling is upward.

For the same reason the upper side in the fire-tube boiler is the hottest and therefore the weakest side. Consequently the buckling is downward.

Another contributory cause is soot. Soot and ash always deposit to greatest depth on the top or outside of the horizontal water-tube boiler. The top side is therefore insulated against heat while the bottom is not. And in fire tube boilers soot and ash deposit on the bottom or inside of the tubes. Therefore the bottom is insulated against heat while the top is not. In other words, it is perfectly natural for horizontal water tubes to buckle upward and for fire tubes to buckle downward.

If the buckling were caused solely by the expansion due to the difference in temperature on the two sides—that is, if there were no change in strength—the buckling would be in the direction opposite to that shown in the illustrations. The buckling is always away from the side of least resistance. That is, the hottest, and therefore the weakest side, always becomes concave.

A study of the theory and practice of columns will explain fully why buckling is always such that the hottest side becomes concave.

Cowell Reopens

Terminating a two-month shutdown, the Cowell Portland Cement Company plant at Cowell, California, resumed operation March 1st.

Cement Statistics for March

Shipments Slightly Below Those of March, 1928—Production Decreases 2.5 Per Cent —Plants Operate at 51.7 Per Cent of Capacity During March

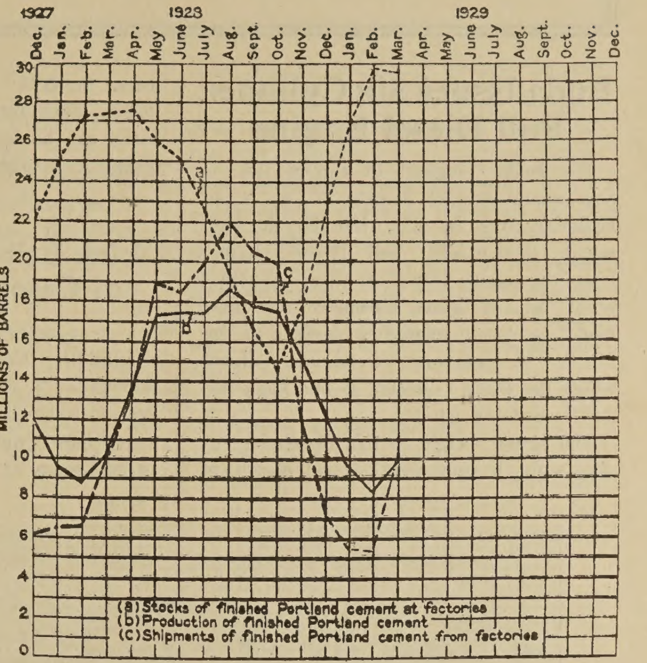
NOTE: IN ORDER THAT THE READER MAY KNOW THE TREND AT A GLANCE, THE HIGHER FIGURE, WHETHER FOR EITHER YEAR, UNDER ANY CLASSIFICATION APPEARS IN SLIGHTLY HEAVIER TYPE.

Relation of Production to Capacity

(Figures represent per cent)

	—March—		Feb.	Jan.	Dec.
	1929	1928	1929	1929	1928
The month	47.4	**51.7**	44.8	46.5	60.4
The 12 months ended	70.9	**74.6**	71.0	71.0	74.0

	1928	1929	Increase or Decrease, Per Cent
Production, March	**10,223,000**	9,969,000	—2.5
Shipments, March	**10,135,000**	10,113,000	—0.2
Stocks at end of March	27,445,000	**29,727,000**	8.3
Total production for year to date	**28,788,000**	28,372,000	1.5
Total shipments for year to date	**23,239,000**	21,228,000	—9.5
No. of plants reporting	155	**160**	



Production, Shipments and Stocks of Finished Portland Cement, by Districts, in March, 1928 and 1929, and Stocks in February, 1929

District	Production—March		Shipments—March		Stocks at end of month		Stocks at end of February, 1929*
	1928	1929	1928	1929	1928	1929	
Eastern Pa., N. J., and Md.	2,512,000	**2,513,000**	2,396,000	**2,506,000**	6,682,000	**6,941,000**	6,933,000
New York and Maine	587,000	**593,000**	499,000	**504,000**	1,866,000	**2,073,000**	1,984,000
Ohio, Western Pa., and W. Va.	851,000	**908,000**	834,000	**869,000**	3,411,000	**3,650,000**	3,611,000
Michigan	**560,000**	476,000	505,000	**543,000**	2,260,000	**2,591,000**	2,658,000
Wisconsin, Illinois, Indiana, and Ky.	933,000	**1,086,000**	**1,004,000**	948,000	3,661,000	**4,049,000**	3,911,000
Va., Tenn., Ala., Ga., Fla., and La.	**1,268,000**	1,028,000	**1,298,000**	960,000	1,935,000	**2,248,000**	2,180,000
Eastern Mo., Iowa, Minn., and S. Dak.	**687,000**	644,000	**730,000**	700,000	3,912,000	**4,297,000**	4,353,000
Western Mo., Nebr., Kansas, and Okla.	**645,000**	620,000	829,000	**905,000**	1,463,000	**1,497,000**	1,782,000
Texas	**552,000**	527,000	562,000	**594,000**	**450,000**	446,000	513,000
Colorado, Montana, and Utah	**160,000**	57,000	**174,000**	144,000	**482,000**	454,000	541,000
California	**1,171,000**	1,170,000	1,082,000	**1,148,000**	860,000	**894,000**	871,000
Oregon and Washington	297,000	**347,000**	222,000	**292,000**	463,000	**587,000**	533,000
	10,223,000	9,969,000	10,135,000	10,113,000	27,445,000	**29,727,000**	29,870,000

Production, Shipments and Stocks of Finished Portland Cement, by Months, in 1928 and 1929

Month	1928—Production—1929		1928—Shipments—1929		Stocks at end of month	
					1928	1929
January	9,768,000	**9,881,000**	**6,541,000**	5,707,000	25,116,000	**26,797,000**
February	**8,797,000**	8,522,000	**6,563,000**	5,448,000	27,349,000	***29,870,000**
March	**10,223,000**	9,969,000	**10,135,000**	10,113,000	27,445,000	**29,727,000**
April	13,468,000	....	13,307,000	....	27,627,000	....
May	17,308,000	....	18,986,000	....	25,984,000	....
June	17,497,000	....	18,421,000	....	25,029,000	....
July	17,474,000	....	19,901,000	....	22,580,000	....
August	18,759,000	....	21,970,000	....	19,374,000	....
September	17,884,000	....	20,460,000	....	16,799,000	....
October	17,533,000	....	19,836,000	....	14,579,000	....
November	**15,068,000**	....	11,951,000	....	17,769,000	....
December	12,189,000	....	7,384,000	....	22,650,000	....
	175,968,000	....	175,455,000	....	....	....

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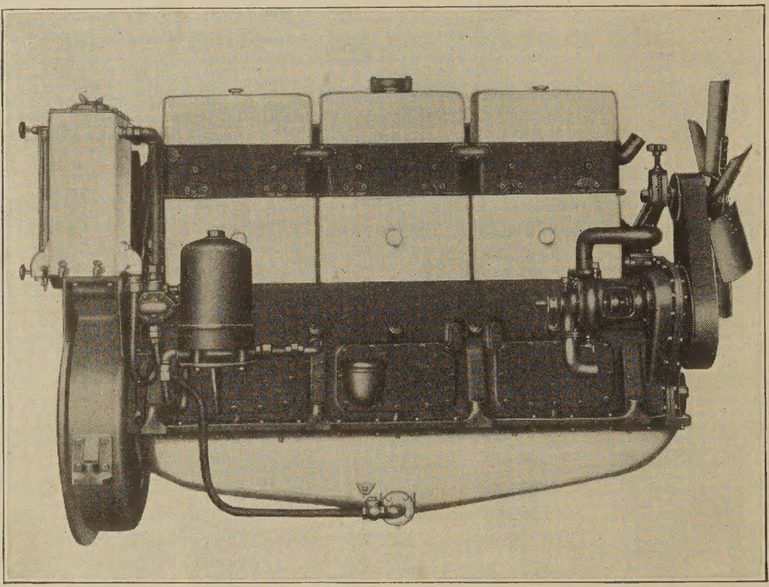
*Revised

Mill Equipment

Buda Issues Six Cylinder Full Diesel Engine

The Buda Company of Harvey, Ill., is now manufacturing a new M. A. N. 6-Cylinder, 6½ by 8¾, 180 H. P. high speed, light-weight, full Diesel engine. Like the other Diesel engines manufactured by the Buda Company this new model is closely related to designs of the M. A. N. Company of Germany, from whom the Buda Company is operating under license and patents.



The actual weight of this 6-cylinder engine with all equipment, except clutch, is approximately 5400 pounds. The overall length is 89 in. and the height is 58 in.

This engine is designed in accordance with the airless fuel injection principle, (spray atomization). Compressed air is not used either for starting or running. The engine is started by means of a small air cooled, two cylinder engine mounted on a bracket which is cast on the flywheel housing. Electric starters can be furnished for starting instead of the two-cylinder gasoline engine if so desired.

Standard equipment consists of fuel filters, lubricating oil filters, air filter, set of tools, starting equipment.

Fuel consumption is very low per B.H.P. hour, according to the manufacturer. Fuel having a Baume gravity of 26 to 38 can be used.

It is stated also that several of these engines have already been delivered to manufacturers for use in industrial equipment. Electric generating units, locomotives, rail cars, dredges, compressors, shovels and many other forms of industrial applications can be handled by these Diesel engines, it is suggested.

Link-Belt Announces Line of Gasoline Locomotive Cranes

Link-Belt Company, Chicago, Ill., has announced a complete line of locomotive cranes designed especially for gasoline engine, Diesel engine or electric motor drive, to be known as the "L" type cranes.

They are not merely modified steam cranes, but are designed throughout for the entirely different and more severe conditions imposed by a power unit running continuously at its full operating speed.

The machinery and its arrangement are particularly adapted to direct engine or motor drive, and all clutches, brakes, shafts, bearings, gears, etc., are oversize in order to give the best operating results and the lowest possible maintenance expense, under these conditions, the firm states.

The drive from engine or motor is a totally-enclosed silent chain drive, and all upper frame gears have machine cut teeth, cut from solid blanks.

It is furnished with two-speed travel gear to give a high travel speed for traveling light, and a slower travel speed for pulling heavy loads or ascending comparatively steep grades. The two-speed travel gear in no wise affects the other speeds of the machine (hoisting, boom hoisting and rotating), which should, under all conditions, remain unchanged in order not to affect the operating speed and handling capacity of the machine.

Industrial Literature

New Jones Catalog

The W. A. Jones Foundry & Machine Company, Chicago, makers of speed reducers, cut gears, pulleys and general power transmission machinery, have just issued a new general catalog known as the *Jones Blue Book: Catalog No. 42.*

The book, of nearly 500 pages, contains complete listing of their line of manufacture, and practical working data of everyday usefulness.

Spiral Conveyor Catalog

The Weller Manufacturing Company, Chicago, is now distributing its new spiral conveyor catalog, numbered 36-D.

This is an 80-page publication. Its initial pages are taken up with shop views, followed by others showing spiral conveyors in actual installations. The customary price lists and specifications, accompanied by illustrations, both line and photographic, follow.

Manganese Steel Office

A sales office has been established in Cleveland by the *Manganese Steel Forge Company*, manufacturers of *Rol-man* rolled and forged manganese steel products, Philadelphia, Pa. The new office is located at 623 Union Trust Bldg., and is in charge of P. M. Hobbs, who has been connected with the sales departments of the company's main office and of the Chicago office, and who will service users and prospective users of *Rol-man* products in the Cleveland territory.

About the Bearings in Equipment

An 150-page volume bound in leather and entitled "Wherever Wheels and Shafts Turn" has just been issued by the *Timken Roller Bearing Company*, Canton, Ohio. The single purpose of the publication is to show the extent to which Timken bearings are used and to provide technical information on bearing mountings and installations. This it does in the two divisions that comprise Part 1 and Part 2, respectively.

With the Manufacturers

INDUSTRIAL LITERATURE

Convey-o-Weigh Equipment

The *Convey-o-Weigh* is a unit of equipment combining conveyor and weigher facilities, being designed to weigh loose, lumpy, crushed, and ground materials of specified test weight without human attendance, in repeated equal loads, and while weighing them, to convey the loads in elongated form, with continuous delivery. The number of weighings made are registered.

A complete description of the Convey-o-Weigh is found in a 32-page publication prepared by the *Richardson Scale Company*, engineers and manufacturers of material handling machinery at Clifton, New Jersey.

In further detail, it states that the Convey-o-Weigh is used to self-weigh, self-register and convey material from any overhead source of supply to the receptacle provided to receive or transport it. There is no agitator provided in the feed hopper since the feed and outlet openings are of such size that the material cannot clog or bridge in the hopper. The feed hopper inlet and exit are both of comparatively large area even on the smallest units There are no narrow spouts, gates or restricted openings, the manufacturer states.

If, in operation, the feed supply is not continuous and the quantity in the feed hopper sinks to the minimum allowed, the feed unit consisting of hopper and feed conveyor tips forward on the V-shaped steel supports and breaks the circuits passing through the automatic shut-down switches. The feed conveyor does not stop immediately as the circuits interrupted by the switches are by-passed so that the power which drives the feed conveyor motor is not yet cut off, the conveyor completing its delivery of the amount needed for an accurate weighing.

On Newhouse Crusher

Bulletin No. 1469 recently issued by the *Allis-Chalmers Company*, Milwaukee, Wisconsin, deals with the Style "B" Newhouse crusher, which is a gyratory type machine.

Outstanding features claimed for this unit are the minimum power requirements, the minimum number of working parts, an absence of all belts and gears and reversible concaves. No expensive foundations are said to be necessary for installation. The unit is self-contained with discharge spout allowing crushed material to be fed direct to elevator or conveyor without additional hopper or chute.

The most efficient speeds for the equipment are said to have been found to be from 860 r.p.m. to 475 r.p.m., the latter, of course, being for the larger crushers.

Pulverized Fuel Equipment Bulletin

A new bulletin on the subject of the *Aero* unit system of pulverized fuel firing has been issued by the *Foster Wheeler Corporation*, 165 Broadway, New York City. This 52-page catalog covers briefly the development and application of the unit system for firing pulverized fuel. Its chief appeal consists of a large number of illustrations showing plants equipped with Aero unit pulverizers and corresponding line drawings giving sectional elevations through the steam generating units.

The exact method of operation of the Aero pulverizer is clearly described and the various parts of the machine are shown photographically. The results of tests are included, as well as a list of industries with the names of nationally known concerns.

A student of the subject will find much of interest in this catalog, and will be able to follow the progress made in fuel pulverizing machines for the last thirty years. This bulletin is known as No. 37, and it will be furnished upon request to the Foster Wheeler Corporation.

NOTES FROM THE FIELD

Six Refractories Combined

The North American Refractories Company, a consolidation of six old established manufacturers of fire brick and related products, has established general offices in the National City Bank Building, Cleveland, Ohio, and is now transacting business from that point. Most of the departments have already been centralized in Cleveland and the others will rapidly follow.

The organization controls fifteen plants, with an annual production capacity of 155,000,000 units. Those participating in the merger are as follows: Ashland Fire Brick Company, Ashland, Ky., having three plants in Kentucky; Crescent Refractories Company, Curwensville, Pa., with three plants in Pennsylvania; Dover Fire Brick Company, Cleveland, Ohio, having two plants in Ohio; Elk Fire Brick Company, St. Marys, Pa., owning three plants in Pennsylvania; Farber Fire Brick, having one plant at Farber, Missouri, and the Queen's Run Refractories Co., with three plants in Pennsylvania.

General offices are at Cleveland and district sales offices are located at Boston, New York City, Philadelphia and Pittsburgh, Pa., and Chicago, Ill. North American Refractories Limited is located at Hamilton, Ontario, Canada.

The plants as they are now consolidated will manufacture fire brick under all processes, namely, hand molding, hand pressing, steamed pressing, and power pressed, in all grades of Pennsylvania, Kentucky, Ohio, and Missouri refractories.

In addition to fire brick, the new organization manufactures fire clay, high temperature cements and plastic fire brick. Some of the individual brands are known as Ashland Crown, Ashland Empire Crown, Buckeye, Crescent, Dover, Elkco Special and Elk Steel, Farber High Grade, Lumber City, North Bend, Queen's Run Glass, and Reliance.

The officers of the North American Refractories Company are as follows: J. D. Ramsay, president; E. M. Weinfurtner, first vice-president; H. E. Stuhler, vice-president and treasurer; J. M. McKinley, vice-president in charge of operations, John H. Cavender, vice-president and sales manager, H. S. Sleicher, vice-president and eastern sales manager; E. H. Gartrell, vice-president in charge of Ashland division, and E. W. Valensi, secretary.

Simplex Motors for American Company Mill

The American Portland Cement Company recently purchased two 1000 HP., 180 RPM., 100 per cent power factor *Simplex* motors for their plant in Foreman, Arkansas, from the *Westinghouse Electric and Manufacturing Company*.

These are the largest salient pole synchronous motors ever applied to cement tube mill drive without the use of a magnetic or mechanical clutch or the equivalent, it is claimed. The motors will be coupled directly to the tube mill pinion shaft. The automatic control supplied with these units reduces all starting operations to the pushing of a button by the operator, according to the manufacturer.

Gypsum

at Extremely

Low Prices

Stucco plaster, a by product in the Terra Cotta industry, can be supplied by thousands of tons annually in quantities desired—*and at a very low price.*

High SO_4

High SO_4 content makes the product highly desirable.

A Waste Product

It comes from moulds which are broken and discarded after use;—hence the low price.

Sold on Contract

Sold on contract f. o. b. our New Jersey plants, only. (Production of southern factory already contracted for.)

Atlantic Terra Cotta Company

Perth Amboy New Jersey

Ideal Financial Report

The Ideal Cement Company reports for the year ended December 31, 1928, a consolidated net income of $2,061,673 after charges, equal to $5.11 a share on the 403,200 no par common shares outstanding. This compares with $2,243,957, equal after preferred dividends(since retired) to $8.33 a share on the 200,056 no par common shares then outstanding.

The consolidated balance sheet as of December 31, 1928, showed current assets of $8,638,573, and current liabilities of $882,604, leaving net working capital of $7,755,969.

In his report to stockholders, Charles Boettcher, president, said in part:

"On July 1, 1928, a recapitalization of the company was effected by means of which all outstanding preferred stock was retired and in lieu thereof, $8,500,000, 15-year, 5 per cent convertible debentures were issued. This has reduced prior charges on earnings and has justified the increase in dividends. Up to December 31, 1928, $220,600 principal amount of these debentures have been converted into stock of the company, making the total outstanding, 403,200 shares."

Canadian Manufacturers Cultivate West Indies Market

The islands of the West Indies are being developed as a market for cement manufactured in eastern Canada. Two new lines of steamers have been introduced between Canada and the West Indies, the steamers being built for the services. One line's terminal is Montreal. The other line is to Halifax, N. S. and St. John, N. B. At some of the islands, the receiving facilities are poor, it being necessary to lighter goods from the steamers to the shores. In order to achieve the best results it would be advisable to ship in waterproof casks. The demand for cement in all the islands is improving, particularly at Jamaica, Bermuda, Bahamas. The outlook for cement is considerably better than lime, with practically all the cement imported from the United States and Canada, and the increased use of this material in construction of the many new buildings on the islands.

Florida Portland Receives Coal Via Barge

Contrary to its custom of having coal delivered to its plant at Tampa, via steamship from Norfolk or Newport News, Va., the Florida Portland Cement Company during March received a cargo of 3000 tons from Mobile, Alabama, via barge through the Gulf of Mexico. It is not stated whether this arrangement is permanent.

Marquette to Increase Capacity Almost 50 Per Cent

On about July 1st the Marquette Cement Manufacturing Company will begin the construction of new buildings and the installation of additional equipment at its plant at Cape Girardeau, Mo. Capacity will be increased from 6,400,000 to 12,000,000 bags.

Marquette Buys Island

The Marquette Cement Manufacturing Company, Chicago, has purchased a 200-acre low island in the Mississippi river near the company's plant in South Cape Girardeau, Mo. The tract was bought from Cape Girardeau County for $250.